JAN. 14, 1915

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MOTOR AGE

BRISCOE

Individuality stands out all over the BRISCOE car. It is not a copy but a creation, possessing an air of exclusiveness that makes an instant appeal to every buyer—built to stand up indefinitely.

In representing the BRISCOE, you are selling a car that gives the purchaser greater value than anything else at anywhere near the price.

You are offering a foreign car, with all that term implies—an automobile of French design mechanically, as well as in graceful foreign body lines—*at an American price.*

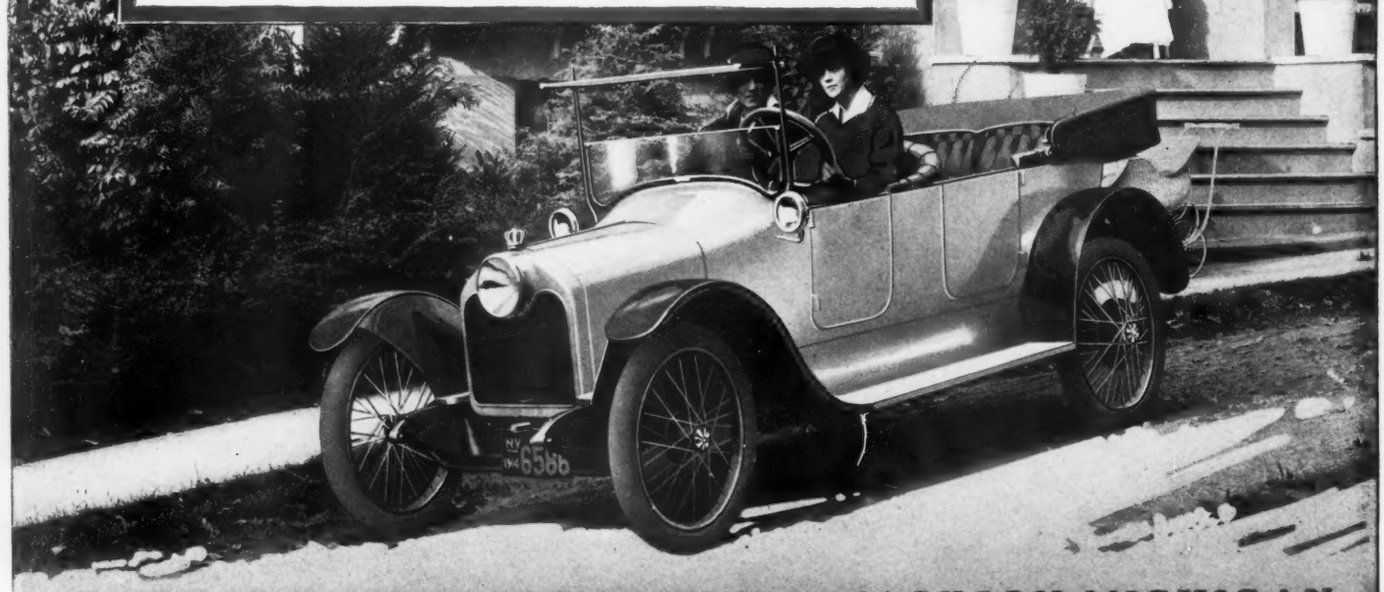
The prospect feels instinctively that here is a car singularly worth while, and the more he studies it, the more positive he becomes—an enthusiastic worker on your behalf—a more valuable sales agent than money could buy.

This is one of many reasons that make the BRISCOE the easiest and most thoroughly satisfactory car for dealers to handle.

CONSIDER THE BRISCOE, FROM ITS UNUSUALLY SMART EXTERIOR TO THE INNERMOST PARTS OF ITS MECHANISM, AND YOU WILL FIND BY FAR THE BIGGEST VALUE, DOLLAR FOR DOLLAR, TO BE FOUND IN ANY CAR.

A liberal contract is offered to all responsible live-wire dealers who wish to increase their profits by the sale of BRISCOE cars. But territory is being allotted fast right now. Better get in touch with us without delay.

$785.00
COMPLETELY EQUIPPED



BRISCOE MOTOR COMPANY INC. JACKSON MICHIGAN

MADE IN DETROIT USA

NATIONAL RADIATORS

MADE IN DETROIT USA

A Hot Engine Kills All Your Pleasure

Engine trouble is nearly always a matter of overheating. The only remedy is ample cooling, which the ordinary radiator does not always give. Many a trip has been spoiled because the hilly roads kept the radiator almost boiling.

NATIONAL RADIATORS

have been designed to obviate this. They keep the engine cool under all conditions, greatly increasing its efficiency and obviating all troubles due to overheating.

An Entirely New Principle of Construction

In place of individual tubes the NATIONAL Radiator is **built of continuous bands of tough corrugated brass,** forming an integral unit, giving great air surface and enormous cooling capacity.

NATIONAL Radiators are practically leak-proof and will last as long as the car.

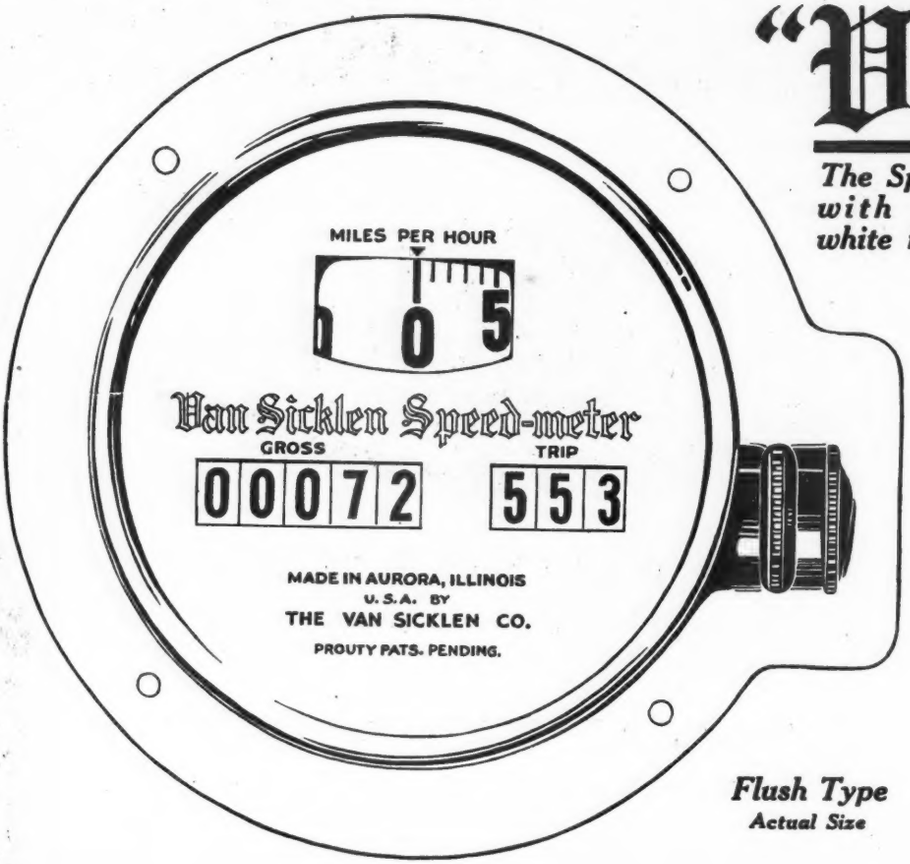
A NATIONAL RADIATOR SOLVES ALL YOUR PROBLEMS—less weight, greater capacity.

THE NATIONAL CAN COMPANY

DETROIT, MICH.

"Van"

The Speed-meter with the big white face - -



Flush Type
Actual Size

There is nothing of the laggard about Van. He starts to work the minute your wheels begin to move, and flashes speed changes the instant the car develops them. He indicates the lowest speed first and will show it in half-miles if you say so. He displays the courage of his convictions by sticking like a burr to one speed at a time. Van never hesitates.

Van's operation being based upon the generation and calibration of a steady flowing current of air, it is mechanically impossible for the speed-indicating dial to rock back and forth, to jump or lag. The dial registers speed at the instant of reading.

Van is made in three models—flush type for cowl-board installation, bracket type and special Ford type.

Van is fully guaranteed in every particular. Prices and full information sent on postal request.

Van made a host of friends at the New York Show. Don't fail to meet him at Chicago, January 23-30, Coliseum Gallery, Space 92.

THE VAN SICKLEN COMPANY

AURORA ILLINOIS

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Next week's issue of Motor Age will be devoted to a comprehensive review of the accessory manufacturing field, with descriptions of the new accessories. Specifications of the electric vehicles also will be given.

Only Four Days More!

Last Forms Close January 18th

Send Your Advertising Copy *Now* for the Jan. 21st Chicago Show Issue of Motor Age—the Biggest Issue of the Year.

See Page 72

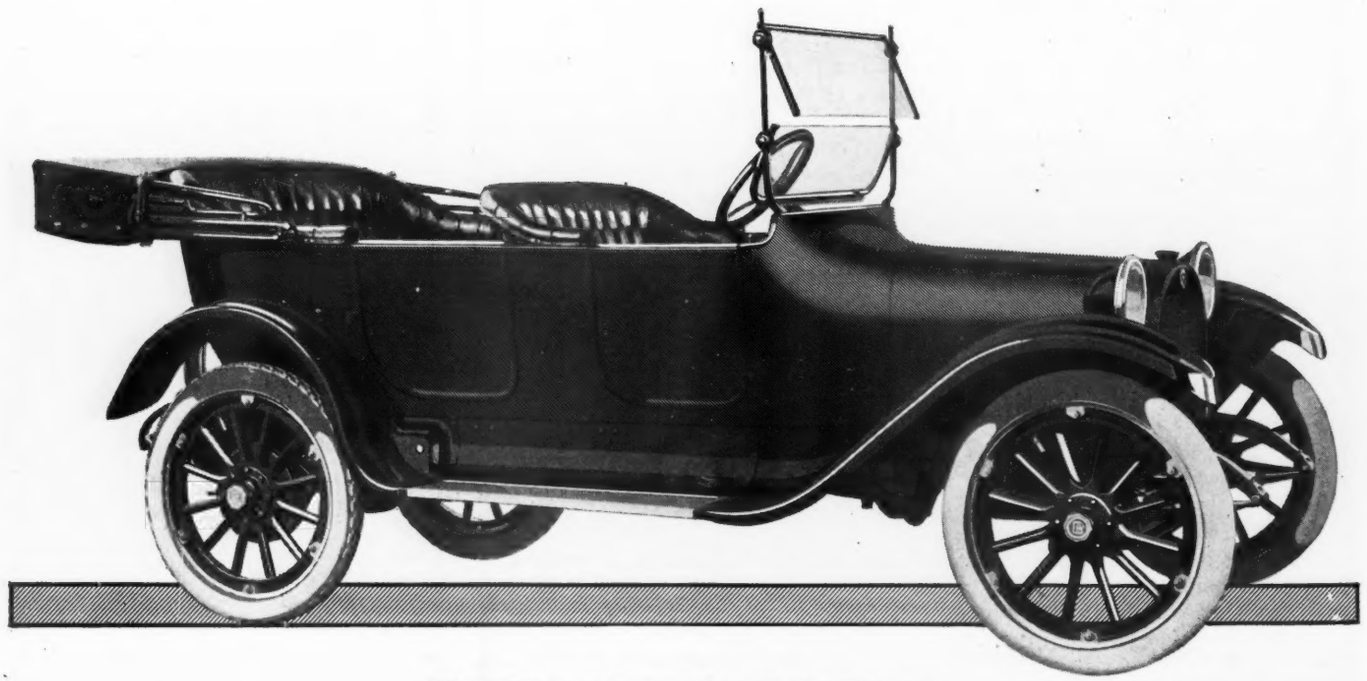
DODGE BROTHERS MOTOR CAR

Not merely a few refinements, but the highest form of refinement at every point, even to minor details.

An example of this is the beauty and completeness of the black enamel instrument board with its equipment of oil gauge, battery gauge, gasoline pressure gauge and pump, carburetor adjustment, speedometer, dash light and switches—all nickeled.

The wheelbase is 110 inches
The price of the car complete is $785
f. o. b. Detroit

DODGE BROTHERS, DETROIT



When Writing to Advertisers, Please Mention Motor Age.

Vol. XXVII, No. 2 Chicago, January 14, 1915 $3.00 Per Year

MOTOR AGE

Kris Kringle Plus Gasoline

by J. C. Burton

WERE Clement Clarke Moore alive today, he would be forced to revise his "'Twas the Night Before Christmas" and bring it up to date in order that it might get by with the juvenile mind of the twentieth century that demands more fact and less fiction than ever before. The most radical change that would have to be made in the most famous of all nursery epics would be the alteration or absolute elimination of the quatrain that reads:

"More rapid than eagles his coursers they came,
As he whistled and shouted and called them by name:
'Now Dasher! now Dancer! now Prancer! now Vixen!
On Comet! on Cupid! on Donner and Blitzen!'"

For the "eight tiny reindeer," which we heard prancing on the roof in our childhood dreams, have been turned out to pasture and no longer do they girdle the globe on Christmas eve. The bells on their harness are rusted; the sleigh that they pulled over the housetops of the world is a relic in the polar regions. Santa Claus now wears goggles. In preparing for his annual trip, he lays in a supply of anti-freeze solution and a set of non-skid chains. With the substitution of steam radiators for large-chimneyed fireplaces has come the substitution of gasoline for reindeer and the modern Santa Claus is a motoring

"Gasoline and electricity, the twin genii of twentieth century trade and commerce, came to the aid of the merchant Aladdin when fifty-ninth-second shoppers rubbed the lamp in desperation"

saint, traveling at a speed at least three times as great as in the days when he depended upon his double four-in-hand of antlered steeds to carry him on his journey of joyous giving.

Kris Kringle plus gasoline is a combination that is hard to beat on the night of December 24. This was conclusively proven in Chicago on Christmas eve, when, between the hours of 6 o'clock and midnight, Marshall Field & Co. delivered the gifts of thousands of last day purchasers with the aid of the largest flotilla of motor-driven trucks and parcel wagons ever recruited by a merchandising house in the United States. Three hundred and ten vehicles, propelled either by gasoline or electricity, played the role of Santa Claus' partners that night and put the achievements of the reindeer to shame. John D. essence and Edison juice were put to the supreme test and, in the vernacular, came clean. A new chapter in Christmas delivery was written. It is a eulogy of the motor truck, which proved its efficiency, speed and stamina under the most trying and exacting conditions yet known.

With its formidable fleet of 310 vehicles, Marshall Field & Co. covered every section of a rambling metropolis that has an area of 191.3 square miles—an expanse of territory approximating one-sixth the total area of the state of Rhode Island—and made deliveries in the suburbs to the north, south and west, some almost 40 miles distant from the center of the city, in 6 fleeting hours, 360 Mercury-footed minutes, 21,600 precious seconds. One truck was sent to Gary, Ind., 38 miles by the road which skirts the shores of Lake Michigan; another to Lake Forest, 33 miles north of Chicago; a third to Wheaton, a trip of 28 miles, and others to Lake Bluff, 30½ miles; Downers Grove, 21 miles; Des Plaines, 16 miles, and Blue Island, 14 miles. It was a grueling marathon race in which gasoline and electricity were pitted against the sands of the hour glass and gasoline and electricity won.

Even Estimates Are Staggering

Just how many thousand packages and how many tons of bulk merchandise were delivered by the Fieldian agents of Santa Claus on the night of December 24; just how many dollars were shoveled into the vaults of the Chicago establishment at the close of business on the day before Christmas, I cannot state definitely. I only know that an enormous business was done. Officials of the company have told me that never before in the history of the colossal store have the holiday receipts been as large as they were in 1914. New sales records were established daily from December 15 on. The resources of every department were taxed to the limit.

Perhaps some idea, a very, very faint idea, of the volume of business done during the pre-Christmas attack of shoppers on the store's miles of counters can be secured by merely looking at the Marshall Field establishment. Two retail stores are operated. One, twelve stories in height, covers an entire city block; the other, known as the annex-store for men, covers one-fourth as much ground and five floors and basement are used for merchandising. This gives the company a total floor space of more than 2 square miles on which goods are sold.

According to one arithmetical wizard, whose mind runs to statistics, Marshall Field's battery of elevators carry more persons in a year than do the two best patronized elevated roads in the city of Chicago combined. Another statistician has estimated that from 8 to 6 o'clock on the twenty-fourth of December, 600,000 shoppers visited the main retail store. This is a horde that even the German kaiser, who sends his subjects to the front to fight and die in half-million lots, could not sniff at with imperial disdain. Doubtlessly these 600,000 patrons bought at least one gift and probably 50 per cent of them told the clerk to "Send it" when asked whether the purchase was to be taken or delivered.

Another measure by which the company's 1914 volume of Christmas business can be estimated is by the increased number of trucks and parcel wagons making deliveries during the time when the tide of holiday buying reached the high water mark. When conditions are normal, in February or July, for example, 175 vehicles are used to distribute the merchandise in the city of Chicago and its suburbs. This number was gradually increased during December until 310 were in operation on the night before Christmas. Seven trucks in this imposing motorcade, huge moving vans owned by storage companies, were commandeered at the proverbial eleventh hour when the store superintendent realized that it would be impossible to make every delivery with the equipment that he had before the chimes, heralding the birth of another Christmas, sounded.

No Vehicles Held in Reserve

This superintendent, by the way, is a resourceful official. He had to be in order that the promise, made in advertisements published in all the Chicago papers the morning of December 24, that "all goods bought in this store up to 6 o'clock will be delivered tonight" would not be repudiated. He knew that it was up to Marshall Field to deliver the goods, both figuratively and literally, and that to deliver the goods, the company's delivery service would be taxed as never before in the history of the organization. He used every gasoline gourmand and electricity-eater that he had in his garages. Throwing caution to the four winds, he did not hold a single vehicle in reserve. If one carrier broke down or was wrecked by a skid on the slippery streets or in a collision with a trolley car, he was without another to replace it. To so tempt fate is contrary to all rules of department store delivery procedure. The majority of the stores along State street, the main lane of bazaars in the middle-western Bagdad, keep at least 10 per cent of their trucks and parcel wagons in the barns to meet traffic emergencies, no matter how pressing the demand for vehicles.

Gasoline-propelled parcel wagons leaving one of the distributing stations on the night before Christmas, loaded with gifts that must reach their destination before midnight or disappointment would chortle in triumph in many homes

"Stanley Field, a scion of Chicago's merchant prince, became so enthusiastic over the herculean distribution maneuvers that he volunteered to make some north shore deliveries with his limousine at a late hour on his drive to his home in aristocratic Lake Forest"

Cars in the Christmas Fleet

In the Fieldian fleet of motor-driven vehicles there were eight dreadnaughts—a double quartet of 3-ton Packards, known as trunk wagons and used to transport trunkloads of small packages and parcels to the five sub-stations situated within the corporate limits of Chicago and to the distributing branch operated in Evanston, a suburb 13 miles north of the city. On these are loaded eighteen huge trunks at a time and on December 24 and for 7 to 10 days previous, they were operated 24 hours daily and with a double shift of men to handle them. In the next division were 147 small electrics, bearing either the General Vehicle or Walker trademark, which were dispatched with small packages from the various sub-stations. Augmenting this flotilla of electrics were sixteen gasoline-driven parcel wagons, products of the Ford, Packard, White and International Motor Co.'s plants. The third division was composed of 139 trucks and vans, ranging in load capacity from 1,500 pounds to 3 tons and hauling furniture and other bulky merchandise. Both gas cars and electrics were represented in this squadron, Packards, Velies, Macks and Whites upholding the prestige of the former class and General Vehicles and Walkers making endurance records with their storage batteries. There were also the seven rented vans, previously mentioned, and the limousine of Stanley Field, a scion of Chicago's merchant prince, who became so enthusiastic over the herculean distribution maneuvers that he volunteered to make some north shore deliveries at a

late hour on his drive to his home in aristocratic Lake Forest.

Such was the array of motor-driven vehicles that made good for Marshall Field & Co. on the night of December 24, and which, by their wonderful achievement, silenced the contention of a few skeptics who continue to doggedly maintain that trucks, propelled by gasoline and electricity, are not dependable and practical. When you consider the thousands of pieces of merchandise that these vehicles delivered, the hundreds of miles of streets and highways that they covered, the hundreds of stops that were made en route and the short time in which they accomplished their record run, the fiction of Santa Claus' trip around the world in a single night, which was invented only for small children to believe, seems almost feasible enough to be accepted as fact by the adult mind.

Gifts, Big and Small, Delivered

No article was too small or too large to be delivered; no purchase too trifling to be carried to the recipient. No line was drawn between the 25-cent book and the $1,000 dining room set. Each was loaded on one of Santa Claus' modern gift transports, rushed at high speed through the city and delivered at its destination before the hands of the clock pointed to twelve. Presents that you could carry in your vest pocket, presents that you would not attempt to carry on your back up a flight of three stairs, all reached the individuals for whom they were intended because gasoline and electricity, twin genii of twentieth century commerce and trade, came to the aid of the merchant Aladdin when, if you will pardon a slight distortion of Sheherazade's tale, fifty-ninth-second shoppers rubbed the lamp in desperation.

Christmas eve delivery is the most arduous of all the deliveries made during the cataclysm of December buying and selling. There are other days during the week just preceding the holiday of holidays when a greater volume of business is done than on December 24, but on those days immediate delivery is not imperative and distribution can be delayed from 12 to 24 hours without causing disappointment in hundreds of homes and complaints from a legion of customers. Santa Claus and his agents, the metropolitan merchants, are in the same fix on December 24. "Putting off until tomorrow" is impossible the day before Christmas. A raging headache, an ulcerated tooth, grandmother's funeral, blocked traffic and all the other stock alibis for not being on the job are no excuses at all with Santa Claus and his aids on that day. Fire and pestilence are not considered even as minor obstacles in the prevention of deliveries.

"Santa Claus will leave our store at 6 o'clock tonight and every purchase made before that time will be delivered the same night" read the advertisement which made all Chicago sit up and take notice at its breakfast table the morning of December 24. This was a pledge, made to the residents of the Illinois metropolis, that required the maximum efficiency to fulfill. A great expanse of territory had to be covered in a very few hours. There was another factor complicating the problem—time consumed in preparing an article for delivery after its purchase. For example, furniture bought at 5:30 o'clock, a half-hour before closing time, had to be sent to the finishing room to be rubbed down and polished and from there, relayed to the packers before it could be loaded on a truck. One customer, a resident of Milwaukee, purchased a mahogany tea cart at quarter to six, with instructions to have it at the Northwestern depot within 45 minutes. This was only one of hundreds of rush jobs that were put through.

City Divided into Districts

System made this unprecedented Christmas delivery possible, system plus gasoline and electricity. The city was divided into districts and sub-districts. To reiterate, there were six distributing stations, one just outside the loop, one on the west side, one on the north side, two on the south side, and one in Evanston, the latter serving the north shore suburbs. From the main store, the shortest haul to a distributing station is ¾ of a mile and the longest 13 miles. The eight Packard trunk wagons vomited merchandise into these branches from sunrise to midnight, making trip after trip from the retail establishment. The territory served by these distributing stations was divided into 144 districts, the number being increased from 112 to meet the abnormal conditions resulting from the enormous amount of Christmas buying. The 163 electric and gasoline cars in the parcel wagon fleet covered these dis-

Interior of one of the distributing stations scattered in different parts of Chicago. In the illustration, one of the loaded trunk trucks is shown. This vehicle is used to carry packages from the main retail store to the branch where the trunks are opened, the packages sorted out by the parcel wagon drivers and the parcels relayed to the buyers or recipients by motor

tricts, taking their merchandise off the trunk trucks. There were no minutes wasted, no confusion in this latter operation. Each parcel wagon driver received two sheets, one showing the trunks in which his packages were packed and the other noting each stop on his route. Furniture and bulk merchandise was sent direct from the warehouse to the purchaser or recipient, the 139 trucks and vans in the third division of the Christmas delivery fleet making such deliveries. The seven rented vehicles carried goods to the suburban points where they were met by parcel wagons which, in turn, relayed the gifts to their destinations.

Over Thousand Cogs in System

Human energy shared with gasoline and electricity the honors of the night of rapid-fire delivery. A regiment of men were employed. There were 700 manning the trucks and parcel wagons, all of which carried at least two men and some three. In addition, there were 350 routers, sheetwriters and packers. Here was an efficiency machine of 1,050 cogs, all interdependent, all working at top speed; a machine in which a single slip would have caused the loss of minutes at a time when minutes were very, very precious. There was a job of work for each man to do that would have taxed the energy and strenuosity of a Roosevelt. Many of the employes in the delivery service did not punch out on the time clock until 2 o'clock Christmas morning.

Weather conditions were anything but favorable. It was cold, the thermometer registering lower on the night of December 24, 1914, than on any other Christmas eve in the last decade. The pavements in Chicago were slippery, making fast driving dangerous, and the rural roads, leading to the suburbs, covered with slush, taxing the batteries on the electric vehicles to the limit and eating up juice at a rate that would make any but a prodigal spender grit his teeth in despair. The moon moreover was bashful. Lovers, the song writers tell us, glory in a moon that sheds but little light, but delivery boys are strongest for Luna when she is most refulgent, for then it is not difficult to read the numbers of the houses at night.

During the 6-hour ride to the aid of an overworked Santa Claus, there were several accidents in which street cars ran afoul of trucks and skids on icy macadam disabled parcel wagons temporarily, but none of the mishaps was irreparable. There were few S.O.S. calls for the repair wagon, a 1½-ton truck that, in its facilities for rendering first aid to disabled vehicles, is the equal of any wrecking train on the most progressive railroad. The repair wagon carries wheels and spare parts for every make of truck in the Marshall Field delivery fleet and also is equipped with a small crane capable of lifting a power plant off the chassis of a 5-ton vehicle. This repair wagon was the ace that the superintendent concealed in his sleeve before he started to play the no-limit game of sending out every truck in his garages.

"Several of the delivery boys had harrowing tales to relate upon the return to the barns, stories of adventures with road agents of the boulevard"

Frisking Santa Claus' Agents

The Kris Kringle delivery was not without romance, even though the dramatic reindeers were replaced by prosaic motors. Several of the drivers and delivery boys had harrowing tales to relate upon their return to the barns, stories of adventures with holdup men and road agents of the boulevard who leveled menacing revolvers at the uniformed agents of Santa Claus and frisked them of money collected on C.O.D. packages. One driver, when ordered to "hold up his hands," jumped car and maxixed with Oldfieldian speed to safety, while bullets bounded precariously off the pavement that fairly steamed from the rush of his getaway.

It would have required at least 500 horse-drawn vehicles to cover the same amount of territory that the 310 motor trucks served on the night of December 24, according to the superintendent. With horse equipment, the same number of deliveries could not have been made in less than 18 hours. The long hauls of from 20 to 35 miles to the suburbs would have been practically impossible, even though the strongest of Percherons had been hitched to the heavy vans. The trip to Lake Forest, 33 miles, for example, with frequent stops for deliveries, would have taken a day and a half had teams been used. Equine muscles could not have withstood the strain of the 24-hour tasks to which the tireless trucks were put.

Records established by Field's motor vehicles during the 10 days preceding Christmas more than justified the substitution of gasoline and electricity for horses. The Fords, formerly used by wholesale salesmen and requisitioned for the holiday delivery service, made the greatest mileage of any of the cars in the fleet, some of them averaging as high as 105 miles daily. The Walker electric parcel wagon, operated in Gary, covered from 75 to 85 miles each day and the odometer on a 3-ton bulk merchandise wagon, traveling between the Chicago warehouse and Gary, showed reading of from 90 to 100 miles on the days when the barometer of Christmas buying threatened to break under the pressure. Sixty miles a day was the average run of the trunk trucks, the motors of which throbbed night and day for a week before the candles on evergreens were lighted and a match applied to the yule log.

Constructional Features of the 1915 American Trucks

Worm-Gears and Traction on All Four Wheels Show Growth

Editor's Note.—For the first time since motor trucks became a factor in American transportation methods and a useful cog in the business machinery of the country there will be no national exposition of commercial vehicles. Though the motor truck industry does not offer an opportunity for the truck buying public to see the American business vehicles gathered under one roof, and thus does not afford a chance for an optical comparison of the products for the new year as it has in the past, Motor Age on the following pages presents a resume and analysis of the commercial vehicle field for the coming season. Following its annual custom, Motor Age presents in this issue a digest of the commercial cars of 1915 *together with their specifications and details and a buyers' guide which will be of assistance to the prospective purchaser of a truck for his particular needs.*

OUTSTANDING features of development in an engineering way in the commercial car industry, as illustrated in the vehicles of 1915 designed solely for business purposes, may be summed up in two words, simplicity, and flexibility. Whether or not these two features of the year have been given an added impetus by the demands of military vehicles in the European war is not a point that can be determined at this time. It is true, however, that both these factors are valuable ones in a vehicle designed for military operations in the field.

In effecting this simplicity it has come through the unit grouping of component parts by standardization, and by new designs by which have been made possible the elimination of many parts necessary in other construction. This simplification has had a two-fold effect and was made an end for a two-fold reason; the reduction of manufacturing and assembling cost, and the reduction of care and attention required when in the hands of the owners. A secondary effect has been to a certain extent, a reduction of weight of the chassis.

To a certain extent, also, this movement for simplicity has made possible the other general trend, that of structural flexibility of the chassis, at the same time this flexibility of the structure has made it possible to simplify certain units. Weight has been saved by the elimination of some parts which were rendered unnecessary by new construction, and by the use of high-grade metals, flexibly mounted, instead of heavier material, mounted rigidly.

One of the features which has made for flexibility, simplicity, and lightness, is by the more extended use of shaft drive to the rear axle; by taking the propulsion and torque directly through the springs instead of by radius rods and torque members; by the unification of the power plant; by the use tubular drive shafts in worm-drive vehicles of long wheelbase, so that an extra universal, bearing and bracket, which are necessary in the two-part solid shaft, are eliminated.

Flatter springs and flexible frames have furthered the flexibility of the chassis, leaving it free to weave and warp under road inequalities without and any tendency to binding the live parts, and permitting less throw in the springs, and thus allowing the frame to be suspended lower.

Greater Accessibility

Compact grouping of the parts and placing these parts in positions where they may be gotten at most easily have increased the accessibility. The necessity for adjustment and lubrication has been reduced by cutting down the number of wearing surfaces and by distribution of such as there are so that group oiling is possible, thus permitting to some extent the use of self-oiling or magazine-oiled boxes.

To a greater extent than before the man who is to operate the truck has been taken into consideration, and the convenience of operation has been looked to. The former tendency of some designers to focus too closely on the mechanical ideal rather than the practical utility and service of their production has been supplanted by some recognition that the motor truck usually must be handled by a comparatively unintelligent operator, and the success of the truck depends to a large extent upon the degree in which it is adaptable to the talents of the men who are to drive it.

The majority of designers this year have placed the driver on the left side so that he is not in the way of the helper, who has to alight and mount the vehicle at each stop. The levers have been put in the center, where they are in the accustomed position for the right hand, but are out of the way of entering or leaving the cab.

Heavy truck makers, or at least the majority of them, have fitted a governor to the motor, so that the driver need not be relied upon to keep the speed below a safe limit. There is an increase in tendency to fix the spark advance or, at least, automatically to control the advance, so that the motor is insured against continued errors in the manipulation of the spark when it is left to the driver.

This all points to the one idea that manufacturers shape their policy to suit the demand of the buyer, and all of these trends show the influence of increasing intelligent truck buying. Manufacturers largely have given up the attempt to maintain arbitrary standards of capacity, design and price. For instance, we find a constantly decreasing number of models offered of 3 tons capacity and an astonishing rise among the lighter sizes. The former orthodox 3 and 5-tonner in the heavy field has begun to lose its position, as it has been found that the average of the demand among truck buyers does not conform so closely to this particular size.

At this time last year there was noted an unusual rush to the light truck, in particular, the 1-ton vehicle. This was due, in all probability to acknowledged under supply of vehicles of this particular size in 1913. Nineteen hundred and fourteen saw, if anything, an over-supply of this particular size, and it is to be remarked that there are fewer 1-tonners among the new vehicles. At the same time both the 2-ton and the 2½-ton truck has shown a tremendous growth simultaneous with a falling off in the 4- and 5-ton sizes. In general, it may be said that so far as sizes go, there has been a falling off in the number of ¾-ton, 3-ton and 4-ton vehicles, and an increase in the ¼-ton, ½-ton, 2, 2½-ton, and 3½-ton vehicles. Rather paradoxically, the 6-ton wagons also have shown an increase in popularity, as have the tractor classes.

On the whole, there has been a slight decrease in the price of the

FOUR-WHEEL-DRIVEN TRUCKS

Numerals Represent Number of Models

Couple-Gear	2
C. T.	1
Duplex	2
Four Wheel Drive	3
Golden West	1
Jeffery	1
Morton	2
Nevada	1
Walter	4
Ware	1

TRUCKS USING FRONT DRIVE

Numerals Represent Number of Models

A & B	2
M & E	2

TRUCKS USING AUTOMATIC SPARK ADVANCE

Numerals Represent Number of Models

Adams	3
Aetna	2
Avery	4
Barker	2
Best	1
Curtis	2
Duplex	2
Harvey	2
Hurlburt	3
Kelly	4
Krebs	2
Mais	7
Packard	5
Roland	2
Saxon	1
Speedwell	3
Stegeman	5
Sternberg	5
Walter	4
Willet	3

TRUCKS PROPELLING THROUGH SPRINGS

Numerals Represent Number of Models

Aetna	2
American	1
Atterbury	3
Autocar	1
Available	2
B. A. Gramm	2
Barker	2
Bessemes	1
Beck	1
Chase	3
Commerce	1
Couple-Gear	2
Croce	2
Crown	3
Dain	1
Decatur	1
Denby	2
Diamond-T	1
Dorris	1
Duplex	2
Fargo	2
Federal	1
Four Wheel Drive	3
Fremont-Mais	1
Gabriel	3
Hurlburt	1
Independent	1
Jeffery	1
Kisselkar	2
Krebs	2
Lippard-Stewart	5
Maccar	2
Morton	1
Nelson & LeMoon	3
Netco	1
Old Hickory	1
Old Reliable	1
Republic	1
Roland	1
Sanford	1
Service	2
Signal	2
Standard-D	1
Standard-O	4
Sternberg	4
Stewart-B	1
Velie	1
Vim	1
Walter	4

commercial vehicle. There are only three sizes in which prices average higher than for the last year.

To cite instances of this trend for new light models there might be mentioned the new 600-pound model of the Brazie line; G.M.C., to a list formerly comprising the trucks whose capacities ranged from 1¼ to 5 tons, has newly added a 1,500-pound model; the Independent, which last year was the Cass, a 3,000-pound vehicle, now appears also as a 1,500-pound truck. Kisselkar is bringing out a 1,000-pound vehicle, Locomobile has added two lighter models, the Old Reliable has added a 1½-tonner to aline which formerly comprised trucks of much greater capacity; Packard is adding a 1-ton, Sanford has a new 1,500-pound vehicle, Sternberg has a ½-ton car, Velie has added two lighter models, a 1-ton and a 1½-ton, Wilcox has a new 1,000-pound car, and the Transit, formerly a heavy vehicle, has a lighter model of 2,000-pound capacity.

Simplicity Important Trend

To return to the point of simplicity, as a trend for the 1915 season, this has been shown probably most forcibly in the very sweeping tendency to the worm drive, a feature which will be gone into more in detail later. Suffice it to say that of the seventeen worm-drive converts for the new season, nearly every one represents a greater simplification, chiefly because the change from chain drive, for instance, to shaft and worm is a simplification in itself, and at the same time the change in final drive has been accomplished by rather sweeping alterations in other portions of the chassis, most of which have been along the line of less complexity of design.

In this trend to simplicity of construction, there may be mentioned in particular the Locomobile, Sternberg, Commerce, which has done away with the friction set and chain drive, the Lauth-Juergens, which has abandoned the chain-drive model, and put in an internal gear drive. The name of this, by the way, has been changed to Fremont-Mais. Waganhals has been simplified by using a sliding gearset of novel design instead of the planetary one. In this new type, the driven shaft is a sleeve around the driving shaft, so that the driving sprocket is close to the engine which is placed transversely in the frame.

Really, the chief specific change of the year is the very decided gain in popularity of the worm drive. There are in all, forty-two different makers producing worm-driven trucks this year as against sixteen for 1914. Of these, five are making their first appearnce. These include the Aetna, Morton, Netco, Old Hickory and Signal. There are seventeen truck makers who have introduced the worm drive for this season and who produced trucks of other designs before. These include: Available, B. A. Gramm, Croce, Federal, Ideal, Independent, King, Krebs, Locomobile, Maccar, Modern, Moreland, Old Reliable, Rowe, Service, Standard of Detroit, and Velie.

Four-Wheel Drive Increases

Four-wheel drive has come into favor very strongly and it is in this direction the effect of military operations probably is most pronounced. The showing made in the war zone by cars which are capable of driving both on front and rear wheels, it is quite probable has been responsible for much of the development in this direction. Last year there were six different makes of nine different sizes, with both front and rear-wheel drive. These were the Couple-Gear, Duplex, Fore-Wheel Drive, Jeffery, Nevada, and Ware. For the 1915 season there are ten different makes and eighteen sizes. In addition to those already mentioned, all of which continue for the coming season, there are the C. T., Golden West, Morton, and Walter.

Other forms of drive have shown some interchange among the manufacturers. Auglaize has changed from internal-gear drive to shaft and bevel reduction. The Republic, which formerly has been double-chain driven, now has an integral gear-driven model. The Sanford, which was chain-driven with the motor under the floor is now internal-gear-driven, and has the motor under the hood.

There have been a number of changes of names among the trucks manufactured. The European type of truck of the General Vehicle Co., known formerly as the G. V. Mercedes, now is called the American Daimler. The Fremont-Mais is the new model made by Lauth-Juergens; the Cass has been renamed Independent; the Devon, made by Merchant & Evans, now is called the M. & E.; Old Hickory is the gasoline car made by Kentucky Wagon Co., manufacturer of the Urban electric; Rollar is the new name of the Hexter, the Walter-Latil has lost its tail and is now the Walter.

In the tractor field there are three new names, one of these is the Bully, another the Mais, and another the Walter. In addition, the Knox, M. & E., and Morton are continued. The Bully tractor marks the entrance of the Mercury into the tractor field. This has three wheels, the third wheel being at the rear and carrying the motor in the rear. A novel tow-hitch is provided with this tractor by means of which thirteen trailers can be drawn around a corner and all made to track. The Knox tractor soon is to appear as a four-wheel design instead of a former three-wheel arrangement, and will be provided with a new form of hydraulic brake, which combines the features of being very powerful, and yet very easily operated.

Other Changes in Design

Other changes in design may be mentioned, among them the new valve-in-head Buick model, instead of the L-head designs. Chase has eliminated all but one of its three-cylinder, two-cycle, air-cooled models, and has turned to the conventional four-cycle, four-cylinder, water-cooled type with worm drive. The Commerce is brought out as a larger car and has a shaft and sliding gear. Mais has entered the tractor field with a model of 1,600 pounds capacity and the C.T. has entered the gasoline field with a gasoline tractor. Packard has changed to left drive and center control, Palmer-Moore has dropped air-cooling, the Service has dropped its friction drive for the conventional type, and the Walter has discontinued its front drive models and is devoted exclusively to designs in which the drive is taken to all four wheels. In the Transit, the motor, instead of being under the floor as in previous practice, is now between the seats.

TRUCKS USED AS SNOW PLOWS

Victorville, Cal., Jan. 5—Two large motor trucks equipped with a snow plow, passed through Victorville today en route to Pine Knot lodge, the famous mountain resort in the heart of Bear valley. This is the first attempt to open the road into Bear valley from the desert side during the winter months and it is claimed that this is the first time that motor cars have been used for snow-shovel work in the United States.

STATUS OF DIFFERENT FEATURES OF DESIGN EXPRESSED IN PERCENTAGES

Tires
Solid 87½
Pneumatic 11½
Cushion ..... ½
Steel ..... ⅛
Wood ..... ⅛
Front, single 98
Front, dual 2
Rear, single 51½
Rear, dual 48½

Motor Location
Under hood 77
Under floor 13
Between seats 5⅛
Under seat 3
Under body 1⅜

Cylinders
Four 96
Two 3⅛
Three ..... ⅛
Three ..... ½
Six ..... ⅛
Block 54¼
Pairs 38¼
Singly 7¼
Threes ..... ¼

Valves
Side 71
Opposite 17½
Side and head 7
Head 3½
Top, 2-cylinder ..... ½

Cooling
Two-cycle ..... ½
Centrifugal 75½
Thermo-syphon 17⅜
Gear 5½
Air 1⅜

Radiator
Finned-tube 42
Cellular 27¼
Square-tube 22
Zig-zag tube 8¾

Ignition
Single 54¼
Dual 41¼
Double 2½
Dual-double 2⅛

Spark-Advance
Hand 59¾
Fixed 21¼
Automatic 17½
2-pt. fixed 1⅜

Governor
Centrifugal 59¾
Loose-ball 8½
Suction 7½
Hydraulic 1¼
Ring ..... ⅜
None 22⅛

Governor Drive
From motor 90¾
driveshaft 4¼
gearset 2¾
front wheel 1½
Duplex drive ..... ¾

Lubrication
Circulating splash 52
Splash-pressure 34
Non-circulating splash 7¾
Pressure 5¾
Fuel injection ..... ½

Clutch
Cone 42¼
Dry-disk 28
Disk-in-oil 17¾
Dry-plate 8
Expanding 2 1/6
Plate-in-oil 1 1/6
Contracting ..... ⅛
Reversed cone ..... ⅛

Gearset
Selective 78¾
Individual clutch 8¼
Progressive 5½
Planetary 2¼
Friction 2½
Electric 2
Hydraulic ..... ¼
Three speeds 82
Four speeds 11½
Two speeds 4¼
Infinite 2¼

Unit with jack-shaft 37¼
Unit with motor 33
Amidships 27¼
Unit with axle 2¼
Unit with drive-shaft ..... ¼

Final Drive
Double chain 57½
Top worm 21½
Bevel 10
Internal gear 7¼
Double reduction 2½
Single chain 1¼
Rear-wheel 96
Four-wheel 3⅜
Front-wheel ..... ⅜

Control, Steer and Lever Position
Left-center 52
Right-right 29
Right-center 12⅜
Left-left 3½
Right-right and center 1½
Left-left and center 1¼

Propulsion
Radius rods 72⅜
Springs 23
Torsion-tube 3
Torque-arm 1⅛

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Weighed and Not Found Wanting

WITH approximately 100,000 commercial vehicles in service in in the United States today and their production increasing in a more rapid ratio than that of passenger cars, the motor truck at last has come into its own. Demanding recognition, and justly, at their birth, the delivery wagon and heavy van, propelled either by gasoline or electricity, were not accorded it at the outset. Man, being skeptical by nature, demanded absolute proof of their practicality before he would adopt them, before he would permit them to serve him, serve him more efficiently and more economically than the horse that they are gradually displacing.

THE high favor in which the motor truck finds itself at the present time in the court of twentieth century transportation is a reward for service rendered, work well done. Today, no one questions the practicality of the commercial vehicle any more than the valor of the medieval warrior, knighted by his sovereign for his bravery, was challenged. The strength and stamina of the truck, like the skill and courage of the knight, have been put to repeated tests. The truck never has been found wanting. The more exacting the task required of it, the more brilliant has been its achievement.

DURING the year just past, the truck was called upon to perform more arduous work than ever before in its history of phenomenal coup de maître. Across the Atlantic, where millions of men are now locked in a death grapple, it has been under fire, both literally and figuratively, for the past 5 months. In bringing the red chronicles of war up to date, the historian will write that the gasoline-propelled vehicle has served Mars more faithfully than any other agent of transport in the centuries of international belligerency and civil strife. In the work of mobilizing thousands of troops, in the work of bringing food to the trenches, in the work of rushing ammunition to the very breech of the cannon, the motor truck has performed invaluable service. It has traveled over highways, good, bad and worse, and under every plague of weather; it has pushed its way across roadless territory; it has borne loads heavier than the maker of the chassis intended it to bear but it always has made good.

THE motor truck has served merchants as well as warriors, it has aided in constructive as well as destructive endeavor. As an aid in the distribution of goods, it has proven itself many times more valuable than the horse. Santa Claus called upon it for assistance in Chicago Christmas eve and its response resulted in an epochal delivery, a delivery in which a flotilla of 310 commercial vehicles distributed thousands of gifts, purchased at a single establishment on December 24, between the hours of 6 o'clock and midnight. And this is only one example of the splendid service that the truck rendered Kris Kringle when the saint of giving was desperate in the eleventh-hour delivery crisis.

MUNICIPALITIES, large and small, have found the motor truck a most efficient mechanical servant. In fighting fires, motor-driven apparatus has saved millions of dollars worth of property because of its superior speed. In street cleaning, motor-driven sprinklers and snow plows have performed labors more arduous than that of Hercules when he was ordered to clean the Aegean stables. Using motor-driven flushers for cleaning sewers and motor-driven carts to haul garbage, officials of metropolitan health departments have reduced the number of men carried on the pay rolls one-half and completed the work of disease suppression twice as fast.

IF YOU want an all-assuring answer to the question, "Is the motor truck practical?" you will not have to search long for an authority to respond. Fire at the department store superintendent, the British military transport expert, the American fireman the laconic interrogation "Horse or motor, which?" and the reply will be the same: "There is no comparison." And, what is more, they know.

The Old Order Changeth

ALTERATIONS in a product, whether they be slight refinements in inessentials or sweeping changes in design, are viewed in two radically different lights. They may be taken to mean that the industry of which these products are a part is in a chaotic, unformed state and has not yet found either its true field or the proper methods of meeting the demands of its field. On the other hand, such changes may be taken to mean a healthy growth in that industry, a progressiveness which is an indication as well as a cause of strength and permanence. The latter ordinarily is the more tenable opinion, for often in industries as in streams, lack of change means stagnation. In an industry as young and virile as the motor vehicle industry, departures from former practice, no matter how radical, providing they fill a recognized need, may be taken as indications of permanent betterment.

IN THE motor truck industry, a comparatively young one, it is true, but one which has been quite conservative during the past few years, there has come seemingly a reawakening, a quickening in the way of development. The student of commercial vehicle design, if he analyze the specifications of the trucks of 1915 as published in these pages, will find that there are more changes noted during the past 12 months, than during a much longer period immediately preceding. In spite of the financial and business depression of the past year, which undeniably has had its effects on the manufacture and sales of motor trucks, many of the makers have not been idle in another way.

IT MAY be that designers have taken advantage of the partial breathing spell thus provided, or it may be that motor truck design has reached that period in its cycle when a certain acceleration is inevitable. Whatever the reason, it is a healthy indication, when makers see that they have not reached the pinnacle of design, that the millenium of possible perfection is not yet come. Not a few manufacturers have added new models and these are not merely additions to previous models, but in nearly every case signalize the embracing by the manufacturer of an idea or a design hitherto unrepresented in that factory.

Britons Ease Up on Restrictions on Rubber Exports

Situation Improve Following Embassy's Announcement

NEW YORK, Jan. 11—The British government has provisionally come to an agreement with the American rubber exporters in Great Britain which will permit of licenses being given under proper guarantees for the export of plantation rubber to the United States from London and Liverpool. A statement issued by the British embassy at Washington says:

"Manufacturers wishing to obtain large shipments will be required to give a bond through their agent in London. In other cases shipments will be allowed to approved manufacturers and dealers who signify their willingness to sign appropriate guarantees. Shipments will be addressed to a bank in New York city, which will not deliver rubber until the purchaser has signed and deposited guarantee with his majesty's consul general at New York city and he sanctions delivery."

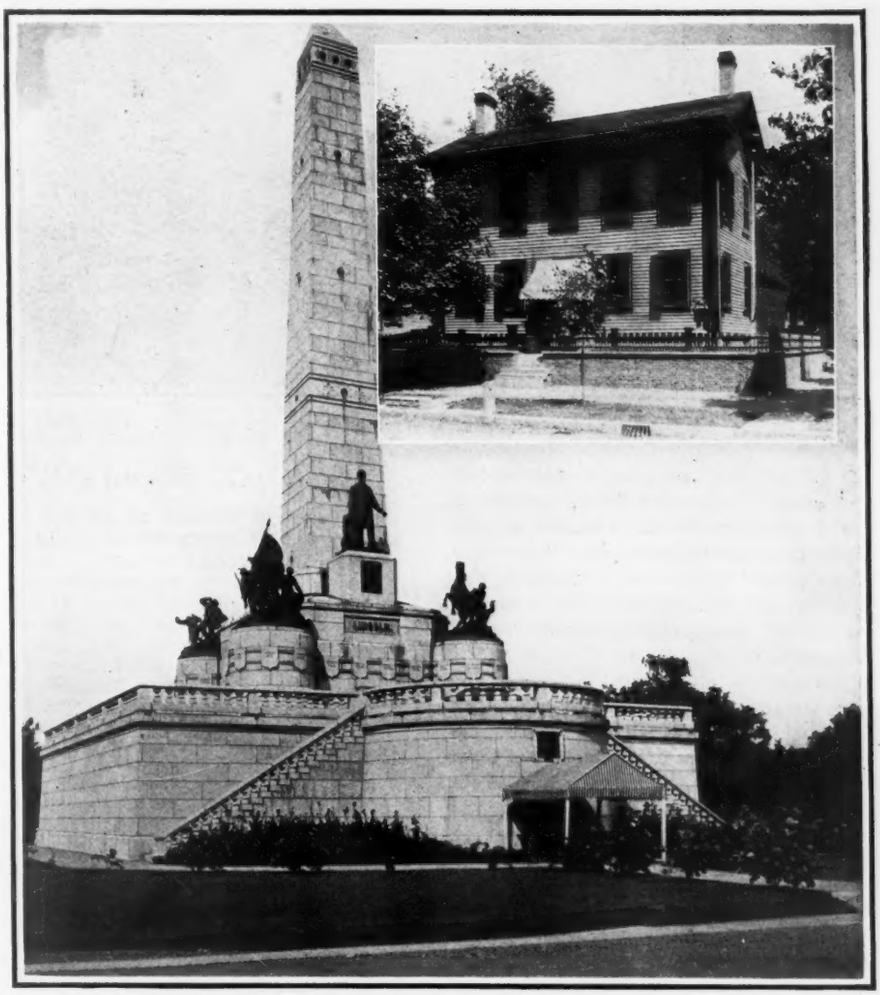
The statement goes on to state that manufacturers in the United States must guarantee not to export any raw waste or reclaimed rubber except to the United Kingdom or British possessions; not to sell rubber now delivered, but to use it in their own factories; to execute orders for manufactured goods from neutral European countries from stocks in the United Kingdom. Shipment to manufacturers who have given such a bond will be allowed direct.

The above announcement has imparted a weaker tone to the local rubber market and prices declined. Fine up-river Para dropped 2 cents, quoting at 67 cents. Pale crepe from Ceylon, which formerly was quoted at 76 and 77 cents, dropped on Saturday to 66. Small sales were reported with the decline. Plantation rubber in London advanced 4 cents, quoting at 52 cents.

A committee of rubber manufacturers has been formed to see that the conditions of the British embargo are lived up to as far as is possible, so as to prevent the restoration of the export prohibiting order. This committee has informed the treasury department at Washington that it will organize a service to prevent the falsification of manifests which might involve reexports of the British rubber products, and it will establish a secret service or institute a clearing house to guard against trading in rubber under false pretenses or without authority.

It is stated that it will be 2 weeks before the machinery for operating this plan will be completed. It is the opinion of well-informed members of the rubber trade that it will take at least a month before rubber can be landed in New York city from London. American manufacturers, it is said, own about 2,000 tons of rubber now held in various warehouses in London awaiting shipment.

See America First — See America Now



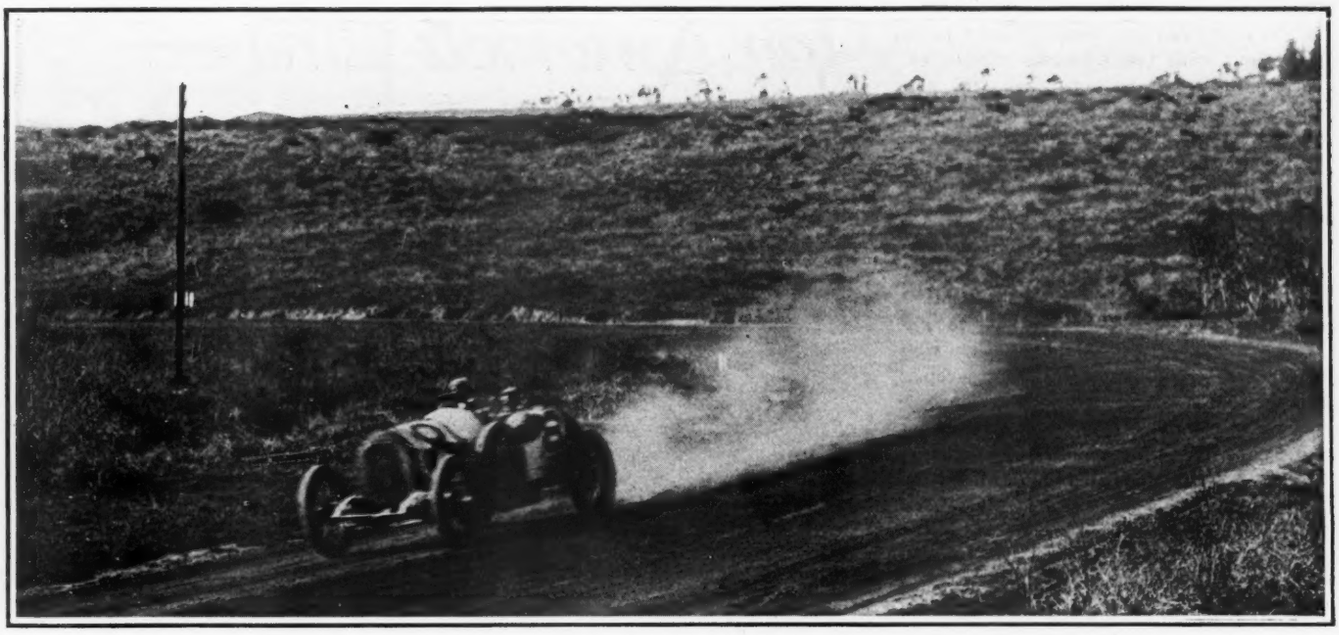
EDITOR'S NOTE—This is the ninth of a series of illustrations and thumb-nail sketches of the scenic and historic wonders of America to be run in Motor Age with the idea of calling the attention of motorists to the picturesque points of interest in their own country.

NO. 9—LINCOLN'S HOME AND MONUMENT AT SPRINGFIELD, ILL.

Among the historical attractions of Illinois, the most hallowed and visited are home and monument of Abraham Lincoln, located at the state capital, Springfield. The former stands in the heart of the older portion of the city, at the corner of Eighth and Jackson streets, and was the residence of the great emancipator when he was practising law and gaining national fame as a statesman through his epochal debates with Stephen A. Douglas. It was in this house that Lincoln lived for 21 years and where he was notified of his election to the presidency of the United States in November, 1860. It is now the property of the state and filled with Lincoln heirlooms. The Lincoln monument, where the martyred president's remains are buried in solid steel and cement, 20 feet below the towering obelisk of marble, stands on the highest eminence in a natural park at Oak Ridge, north of the city. It was constructed about a half-century ago but was entirely rebuilt in 1900-01 and has cost to date approximately $500,000. All the presidents of the United States since 1865, with the exception of Grover Cleveland, have visited it and written their names in the registers, which run back 43 years and contain millions of signatures.

Cooper Starts New Year With a Win at San Diego

Stutz Driver Defeats Brilliant Field in California Road Race



EARL COOPER IN WINNING STUTZ COMING OUT OF CANYON NEAR ROSEVILLE

SAN DIEGO, Cal., Jan. 9—Special telegram—California's Mercurian fete is on and to Earl Cooper, a native son, belongs the glory of scoring the first victory in an epochal speed carnival that will thrill residents of the Golden state and thousands of world's fair visitors for more than 2 months to come.

Driving the Stutz, which has become as proverbial with Cooper as the cigar that Barney Oldfield inevitably chews, the young Californian today won the Point Loma road race, an added attraction to the San Diego exposition and the first of four classics to be run on the Pacific coast before the ides of March.

Carlson But 90 Seconds Behind

It was a closely contested victory, the winner crossing the tape only 90 seconds ahead of Billy Carlson, the Maxwell driver and another native son, who took second place and incidentally hung up a new world's nonstop record of 305.82 miles. Cooper covered the fifty-one laps of the dangerous 5.99-mile course in 4 hours 40 minutes 10⅘ seconds, an average of 65.35 miles per hour. Cooper's time today is the slowest in his speedy career and the slowest ever made in any race on the coast since the inaugural of the Santa Monica event in 1910, when Harris Hanshue, at the wheel of an Apperson, averaged 64.45 miles per hour in leading the field home. Today's time, however, is considered remarkable for the San Diego course which has a number of grades and, moreover is new, consequently not being as fast as the Santa Monica and Corona roads on which world's speed records have been attained.

By Al G. Waddell

ORDER OF FINISH IN POINT LOMA ROAD RACE.

Finish Car and Driver	Time	M.H.
1—Stutz, Cooper	4:40:10⅘	65.35
2—Maxwell, Carlson	4:41:47	64.96
3—Duesenberg, Alley	4:51:55⅗	63
4—Mercer, Ruckstell	5:17:58	57.6
5—Alco, Taylor	5:39:22	54.1

Duesenberg, O'Donnell - Callaghan, running when race was called.

Peugeot, McCarthy, out on 41st lap, broken connecting rod bearing.

Maxwell, Oldfield, out on 37th lap, engine trouble.

Carling special, Dickey, out on 25th lap, burned out connecting rod bearing.

Peugeot, Rickenbacher, out on 23rd lap, broken connecting rod.

Mercer, Louis Nikrent, out on 14th lap, broken gas line.

Tahis, Gable, out on 11th lap, broken wrist pin.

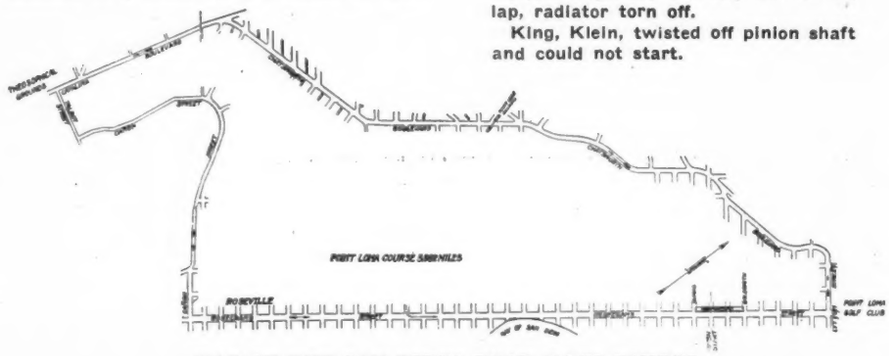
Marmon, Cadwell-Janette, out on 7th lap, cracked cylinder.

Peugeot, Burman, out on 7th lap, broken connecting rod.

Duesenberg, Callaghan, out on 1st lap, wrecked.

Gordon special, Gordon, out on 1st lap, radiator torn off.

King, Klein, twisted off pinion shaft and could not start.



MAP OF THE SAN DIEGO ROAD RACE COURSE

Nonstop Record for 305.82 Miles

Because of the slow time, Carlson's nonstop achievement, at a rate of 64.96 miles per hour, loses much of the punch that a feat of this sort generally carries. True, he bettered the mark of Barney Oldfield, who drove 301.81 miles without a single halt in the recent Corona speed massacre, but Carlson's average today was more than 20 miles an hour less than that of the veteran and for that reason, it is unjust to give him credit for a better performance than that of the "master driver of the world," who averaged 86.2 miles per hour on Thanksgiving day.

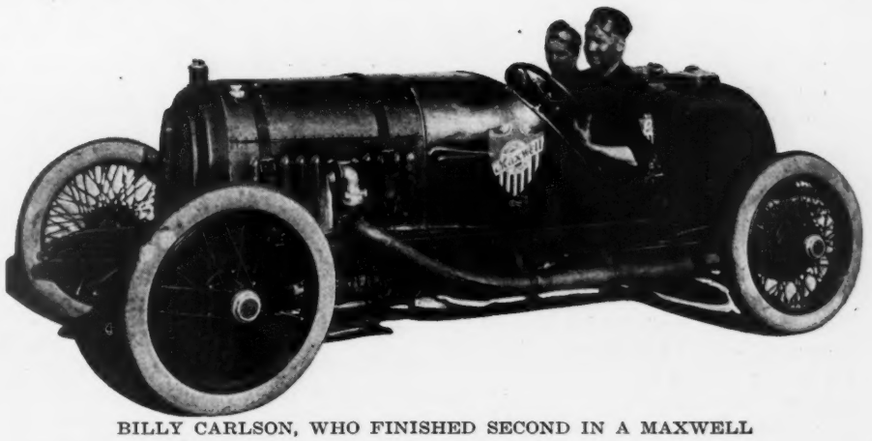
Third place in today's contest went to Tom Alley, the speed meteor among the unknowns, who forged to the front last season. De Palma's former mechanician, who was at the wheel of a Duesenberg, got the checkered flag 10 minutes after Carlson shot over the line but he was a more serious contender than the comparative times at the finish show. Alley went to the front at the start of the race and although forced to surrender this coveted position at the completion of 108 miles, he

was always up with the leaders and running dangerously close to the pacemaker. He drove a plucky race and stopped three times at the pits, once for tires and twice for gasoline and oil.

Only two other cars, out of a field of eighteen starters, finished. Guy Ruckstell, the young California protege of George Bentel and the driver of the No. 5 Mercer, took fourth money after playing in hard luck throughout the contest. After completing six circuits of the course, he lost an entire lap when forced to stop three times to repair a sticking air gauge. With the race half over, he lost more ground in making a tire change and taking on fuel. Engine trouble cost him another lap at the end of 215 miles. But Ruckstell was game. He met misfortune's many body blows with hooks of persistence and reaped $750 as a reward for his tenacity.

Taylor Fifth in Slow Car

The last contestant to get the checkered flag was William Taylor, driving the same Alco which defeated Ralph de Palma's crippled Mercedes in the grand prize at Santa Monica last February. Taylor's car was the slowest on the course. It was lapped several times by the leaders before the race was half over but kept religiously and gamely to its touring car pace and gradually climbed up into seventh position. O'Donnell, in a Duesenberg, pushed the Alco hard, however, until the fortieth lap when a burnt out coil made a stop imperative. The stop was costly and although the Duesenberg resumed the chase, there was not enough speed in it to overtake the rattling Alco and capture last prize money.



BILLY CARLSON, WHO FINISHED SECOND IN A MAXWELL

When Taylor finished with an average of 54.1 miles per hour, the Duesenberg was the only car running and was flagged in, ending the race.

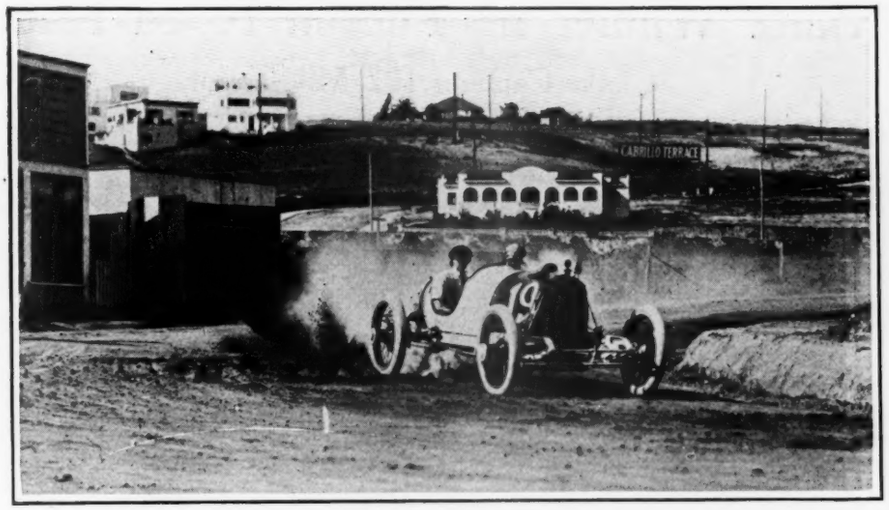
The phenomenal speed attained at Corona Thanksgiving day, when Ed Pullen established a new world's road racing record of 86.8 miles per hour for 301.81 miles, made the San Diego race resemble a contest between turtles. There was none of the intense excitement, such as featured the Corona classic, and none of the keen interest, which has marked the events at Santa Monica. After Cooper and Carlson had finished, the crowds, which mobilized at the turns leaving the huge grand stand half empty, began to leave. When the triumphant Stutz got the checkered flag, there were six cars left on the course to fight it out for four splits of the prize money. They were strung back for eleven laps and it was an hour before the last survivor was flagged off the roads, ending the race.

Victor Works Fast at Pits

Cooper deserved his victory. He drove today as he always drives, with his head as well as his hands. His greatest racing virtue, his wonderful judgment of pace, was largely responsible for his triumph. He was not impatient. He awaited his opportunity before attempting to go out in front. At the pits, the Stutz driver and his mechanician, Dutton, worked with the sleight-of-hand speed of magicians, changing tires, taking on supplies and making minor repairs with astounding rapidity.

That it was a grueling test for the cars is evidenced by the fact that only six machines out of eighteen starters were running when the race was called and that when the contest was half over, only eight were thundering over the roads. The first lap was a circuit of trouble for the drivers. Klein did not even get across the wire. At the start, he twisted off a pinion shaft, locking the whole rear end of the King. The car could be pushed back but all the officials on the course could not shove it forward an inch.

The Gordon Special failed to complete a lap. It struck a railroad crossing on the backstretch, blew three tires simultaneously, and tore off radiator in a collision against a curb. The spectators escaped in-



O'DONNELL IN DUESENBERG ROUNDING ROSEVILLE TURN

EQUIPMENT ON CARS ENTERED IN SAN DIEGO EXPOSITION ROAD RACE, JANUARY, 9, 1915

No.	Car	Driver	Carburetor	Magneto	Plugs	Tires	Oil	Wheels	Mechanic
2.	Duesenberg	Alley	Master	Splitdorf	Rajah	Riverside	Monogram	Wood	Shipley
3.	Tahis	Gable	Master	Bosch	Rajah	Michelin	Texico	Wood	Carleton
4.	Mercer	Ruckstell	Rayfield	Bosch	Bosch	Firestone	Castor	Rudge-Whit.	Jepsen
5.	Gordon Special	H. Gordon	Master	Bosch	Rajah	Firestone and Goodyear	Oilzum	Houk	W. W. Gordon
6.	Peugeot	Burman	Master	Bosch	Rajah	Nassau	Castor	Rudge-Whit.	Schrader
7.	Peugeot	Rickenbacher	Zenith	Bosch	Rajah	Nassau	Oilzum	Rudge-Whit.	Debolt
8.	Stutz	Cooper	Schebler	Bosch	Bosch	Firestone	Motoreze	Rudge-Whit.	Dutton
9.	Peugeot	McCarthy	Claudel	Bosch	Rajah	Nassau	Oilzum	Rudge-Whit.	Linthwaite
10.	Duesenberg	Callaghan	Master	Splitdorf	Rajah	Riverside	Oilzum	Wood	Lecocq
11.	Marmon	Cadwell	Master	Bosch	Bosch	Silvert'n Cord	Valvoline	Houk	Williams
12.	Mercer	L. Nikrent	Rayfield	Bosch	Bosch	Firestone	Castor	Rudge-Whit.	K. Nikrent
14.	Maxwell	Oldfield	Harroun	Bosch	Rajah	Firestone	Castor	Houk	Hill
15.	King	Klein	Rayfield	Bosch	Bosch	Firestone	Oilzum	Rudge-Whit.	Comer
16.	Carling Spl.	Dickey	Master	Mea	Bosch	Pennsylvania	Panama	Wood	Lambla
17.	Maxwell	Carlson	Harroun	Bosch	Rajah	Silvert'n Cord	Castor	Houk	Goetz
18.	Shields Spl.	Shields	Rayfield	Bosch	Bosch	Firestone	Motoreze	Wood	Young
19.	Duesenberg	O'Donell	Master	Splitdorf	Rajah	Riverside	Oilzum	Rudge-Whit.	Henderson
20.	Alco	Taylor							

jury by a miracle and Huntley Gordon, the driver, was fortunate to get out unhurt.

Callaghan, driving the No. 10 Duesenberg, wrecked his car on the first lap. He missed the curve at the Talbot street turn and crashed headon into a telegraph pole. He suffered the only injury of the day, breaking two teeth when his face was shoved against the steering wheel, but later relieved Eddie O'Donnell, his teammate.

Bob Burman, with the Boillot Indianapolis Peugeot, started with Oldfield and Cooper as one of the favorites but went out on the seventh lap with a broken connection. On the same lap, the No. 11 Marmon encountered spark plug trouble and its driver, Cadwell, spained his wrist when he bumped over the car tracks. He was relieved by Tony Janette, who completed another circuit of the course before he was forced to dock the car permanently because of a cracked cylinder.

The Tahis, with skyrocket-shaped oil tank on the hood, failed its driver, Gable, on the eleventh lap when it was running fourth. A broken wrist pin forced him to leave it beside the road in the Canyon. A flying stone broke a gas line on the No. 12 Mercer and put Louis Nikrent out of the running on the fourteenth lap.

Rickenbacher Quits When Leading

When showing the way to the field on the twenty-third lap, Eddie Rickenbacher broke a connecting rod on the Peugeot and the German played the role of spectator thereafter. The Carling Special burned out a connecting rod bearing on the twenty-fifth lap when running in ninth place.

Barney Oldfield was a dangerous contender until the thirty-seventh lap when he retired the Maxwell with engine trouble, the exact nature of which will not be known until the car is torn down. Faulty spark plugs kept the "master driver" busy from the start and he changed a complete set twice, once on the seventeenth and again on the twenty-seventh lap, losing much time.

McCarthy, up on the No. 9 Peugeot, was in fifth place on the forty-first lap when his mount suffered a broken connecting rod bearing near the Rossville turn. On the same lap in the Canyon, O'Donnell burnt out a coil and was relieved by Callaghan whose loss of two teeth did not prevent him from running to the pits, repairing the damage to the car and resuming the race. He finished outside the prize money, however, despite such Spartan courage.

The cars were started in pairs at 30-second intervals. Of the nineteen entered, Harry Grant's Sunbeam was the only machine that was not at the tape. Grant made his nomination at the proverbial eleventh hour, after conferring with the promoters, but this morning received a wire from William Zeigler, the owner of the English speed creation, ordering a withdrawal.

Tom Alley went to the front at the start and held the position of pacemaker for eighteen laps when he was passed by Rickenbacher's Peugeot. The French car showed the way for four more laps and then was eliminated, Cooper's Stutz moving up automatically to first place and holding the lead until the end.

Carlson started well down the list but worked up gradually. He was running third on the twenty-seventh lap and moved up to second on the thirty-third. At one time, he was only 52 seconds astern Cooper but never caught the Stutz.

Fifty Thousand Watch Race

Fifty thousand spectators witnessed the race which was promoted by the Al Bahr temple of the Mystic Shrine to advertise the Panama-California exposition, which opened here New Year's day. One hundred nobles guaranteed $100 each, making a purse of $10,000 which was split five ways —$5,000 for first, $2,500 for second, $1,250 for third, $750 for fourth and $500 for fifth place. An additional $2,500 was hung up to be awarded the winner if the world's road racing record was broken. The money is still in the bank.

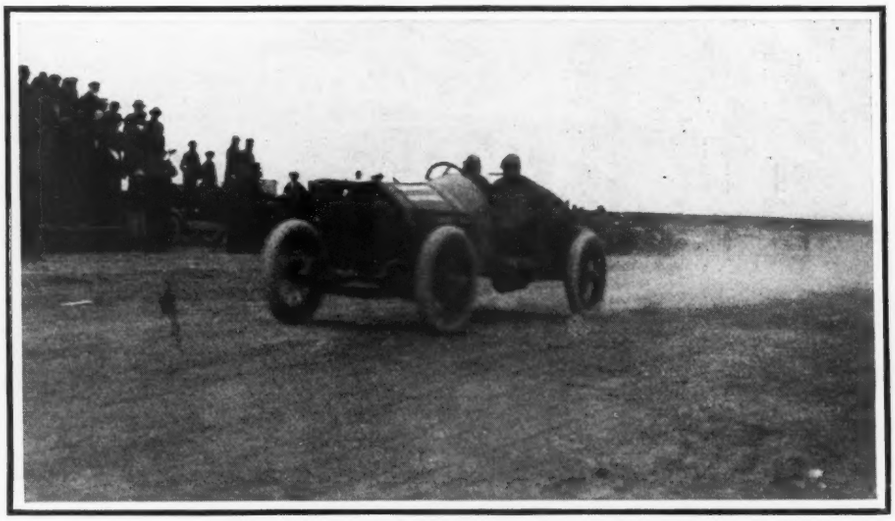
The course on which the race was run measures 5.982 miles and is featured by many curves and hills. From the grandstand, which seats 6,000 persons and is located on a 2-mile straightaway opposite the pits and scoreboards, the course is down grade to a sharp turn flanked by telegraph poles. From this corner to the turn at the Theosophical Institute grounds, there are several drops and climbs. The turn at the head of Canyon street is banked the wrong way and comes after a drop of 20 feet in a block. It is all down grade through the Canyon to the Rossville turn, where the straightaway rises gradually to the finishing line and then starts down.

There is a touch of romance hovering over the course. The turn at the famous Theosophical Institute grounds is at the summit of Point Loma, about half way out to the old Spanish lighthouse erected on the site made famous by Father Serra in the early days of old California. The course is not paved. The road is built on a solid clay foundation and is sprinkled with salt water from the bay which holds the dust and makes the boulevard very fast except in rainy weather when it is dangerously slippery.

The race was well managed, the course being guarded by a detachment of U. S. marines. This was the first time that federal troops have ever been used to patrol any motor race course on the Pacific coast or have been used in the promotion of any form of sporting event. The marines were detailed for race duty by the commanding officer after a formal application had been made by the members of the exposition race committee, who set forth that the sailors were camped at the exposition for service and that the guarding of the roads would be one of the greatest services that could be given during the exposition year.

Stutz Winner in Tucson Road Race

Clarke Captures 102-Mile Event



DICK CLARKE WINNING TUCSON ROAD RACE IN A STUTZ

TUCSON, Ariz., Jan. 9—Averaging 54 miles an hour over a course that was soft and badly cut up on the turns, Dick Clarke, driving a Stutz racer, owned by Harold Steinfeld, won the first race held in Tucson under the auspices of the A. A. A. The total distance covered was 102 miles for prize money totaling $1,000.

Clarke started last in a field of eight and drove a consistent race to the finish, passing one competitor after another, and not stopping once in his flight. At the finish he was 3½ miles ahead of "Red" Brewer, who took second place in a Marmon. Clarke's time was 1:53:13 and Brewer's 1:59:02. Maxwell, at the wheel of a Fiat, finished third in 2:05:59. Billy Delno was fourth in a Moon; time, 2:09:54. Various troubles caused the other cars which started to drop out before the finish.

The entries for the race, and the order in which they started, were:

Speedwell, Dillon Moore, of Tucson, driver; Marmon, Tom Brewer, of Globe, Ariz., driver; Moon, R. H. Delno, of Tucson, driver; Fiat, J. O. Maxwell, of Tucson, driver; Mitchell, Charles G. Miller, of Tucson, driver; Buda-Elmore, L. B. Hart, of Tucson, driver; Buick, George W. Caywood, of Tucson, driver; Stutz, Richard Clark, of Tucson, driver.

The presence of the big Fiat in the race added considerable interest. The car is owned by E. E. Hewlett, of Los Angeles, and would have made a much better showing than third place had not carbureter trouble developed. Five stops were made during the contest. On one lap alone 5 gallons of gasoline ran through the carbureter.

An accident in which the participants had a lucky escape from injury occurred at the start. The Buda-Elmore, which carried No. 6 in the race, had not gone 100 yards away from the starting line when the right rear wheel came off, the axle having snapped. The driver and mechanic were not even jolted from their seats. Had this happened after the cars were under way a serious accident might have resulted.

The fastest lap was made by the Stutz, the 5.1 miles being covered in 5 minutes 26 seconds.

About 3,000 people witnessed the contest held under the auspices of the newly-organized Borderland Automobile Club. The prize money was divided $500, $300 and $200.

The course is a fairly level one, there being a few low hills on the almost perfect oval it covers. A permanent grand stand has been erected at the start and finish line, and in the near future the entire course will be fenced in, it being the intention of the local club to continue the promotion of racing. Experts have pronounced this the best road racing course in the state, as well as one of the finest in the west.

The club is talking of holding another race early in the spring.

Philadelphia and Milwaukee Shows Are Now On

Big Exhibitions Follow on Heels of New York Display

PHILADELPHIA, Pa., Jan. 9—The doors of the Metropolitan building, Broad and Wallace streets, were thrown open tonight on the fourteenth annual show of the Philadelphia Automobile Trade Association. The show will continue until next Saturday night. Taking advantage of the opportunity afforded by the fact that a number of prominent representatives of the industry are here or are to come during show week, meetings and luncheons are scheduled for every day in the week, most of them taking on the form of informal gatherings and get-together meetings for mutual advantage.

Fifty-six companies are represented on the show floor exhibiting fifty-four different makes of gasoline-propelled cars, one steamer and five electrics. Five accessory dealers are included. There are no trucks.

The exhibition occupies 40,000 square feet of floor space. In point of everything but size the show that opened tonight outstrips all predecessors. The stage settings are elaborate and beautiful. The color scheme is royal blue and cream, forming a contrast to the exhibits that shows the latter off to their best advantage. Suspended from the ceiling are numerous semi-direct lights that shed an eye-resting glow. In harmony with the surroundings neat electric signs designate the various exhibitors. Two orchestras furnish continuous music, one at the eastern end of the floor, the other at the western. Independent entrances and exits have been built to facilitate handling the crowds.

Unusual interest is manifested in this year's show, and it has definitely and decisively answered two of the most important causes of argument ever before presented at one time, first and most important—hard times.

Talk of trade depression, real or psychological, has no place either in the thoughts of the committee that staged the show or in the minds of the many exhibitors that made it a success. Facts and conditions face the trade that spell a banner year in 1915. Opportunities exist which by reason of extraordinary conditions all over the world are bound to redound to the advantage of the American manufacturers and plans accordingly are being made to handle the increased business.

Detailed examination of the new models was almost an impossibility tonight, however, owing to the jam. The eight-cylinder car, streamline bodies, simplification of motors, lighter weight, stronger construction, accessibility, comfort—all were topics of demonstrators and they were given no rest from opening to closing hour.

The Milwaukee Show

Milwaukee, Wis., Jan. 9—The seventh annual exposition of the motor car and allied industries opened in the Auditorium last night, under the auspices of the Milwaukee Automobile Dealers' Association. It was the fourth show under the direction of the M. A. D. A., the first three having been managed directly by the Milwaukee Automobile Club.

The decorative scheme this year is somewhat different from a year ago, but no one pays attention to decorations at the Milwaukee show because little attention is given to that feature.

Milwaukee's annual show is principally a retail affair and probably the best single boost for car sales in Milwaukee and vicinity. However, the fact must not be lost sight of that at least 70 per cent of the exhibitors here are state agents for the several lines they handle, and show week brings to Milwaukee a large percentage of the sub-dealers and agents throughout the state of Wisconsin, not to contract for season's allotments, for that has been history for 2 months or more, but to bring prospects to see the show and get into personal touch with the state agent and make reports on progress, and seek the easily granted assistance of state agents in closing obstinate prospects. In that manner the sales record of each Milwaukee show is exceptional and exhibitors feel well repaid for the expense of making displays.

During 1914, Wisconsin took 18,515 new cars, as compared with 10,068 new cars purchased in the state during 1913. Talks with state agents who know conditions indicate that the 1915 absorption will be no fewer than 25,000 cars, and nearly all requisitions are on that basis. This is more than the total number of cars owned in Wisconsin during the year 1912. The aggregate attendance at the Milwaukee show is approximately 50,000 for the 7 days it runs.

ELECTRIC SHOW AT DENVER

Denver, Colo., Jan. 9—Denver's first motor car shows, exclusively for electric vehicles and their accessories, is being held this week in the show room of the Denver Gas and Electric Light Co. The event is being well attended and the interest shown thus far is regarded by the exhibitors as evidence that the fair will prove a substantial stimulant for trade. In fact, seven sales have been definitely closed during the first 3 days of the show. Five of these contracts are for passenger vehicles and two for trucks.

The exhibit includes twelve cars, representing different models of the following makes: Baker, Detroit, Fritchle, Ohio, Rauch & Lang, and Walker (truck).

Denver claims to be at or near the top of the per capita record for electric vehicles, being now within only a few cars of the thousand mark. Of this total number, all but about seventy-five are passenger vehicles. Consequently this show is a popular society event.

The Milwaukee show comprises three distinct departments, viz: motor cars, accessories, including tires, and commercial vehicles. The last-named display this year is featured by the exhibition of trucks built for the armies of warring Europe, which will be shipped to the seaboard immediately upon the close of the show. Kissel, Sternberg and Jeffery are among these builders of war vehicles.

Attendance Records Broken at the New York Show

Wall Street Renews Interest in Motor Industry

NEW YORK, Jan. 11—Acting as a stimulus to Wall street and business activity throughout the country, with a 12 per cent gain in paid attendance and showing a tendency among the manufacturers to announce their new models at show time, the New York show closed its doors last Saturday evening on the most successful week in its history.

Retail sales made were well in advance of the best records of previous years, low-priced cars proving good retail sellers. Over 4,000 dealers visited the show and many agencies were closed for the newly announced cars. Great interest was shown in the eight-cylinder cars, while the low-priced cars are evidently steadily gaining in popularity, as they were constantly surrounded by appreciative groups.

Three features of the show are especially noteworthy—its effect on the bankers of Wall street and general business conditions throughout the country, the tendency of car manufacturers to hold their announcements until show time and the consistent gain in attendance. Wall street men were greatly surprised at the interest shown by the public and at the extensive car sales. These men cannot seem to get over the idea that the motor car is a luxury and apparently cannot be brought to understand that it has come to be a necessity. As a direct result of the public confidence in the motor industry brought out at the show, motor car and tire stocks rose in value and the general market itself was strengthened. The motor industry is setting the example in progressive prosperity to all the large industries of the country which have been complaining of the general depression but have done nothing to relieve it.

That car makers should make their announcements of new models, changes in price, etc., at the show was the original idea. For years the manufacturers have been drifting away from this policy but now they show a laudable tendency to return to it. Following this plan, the winter and spring months permit the factories to carry out their manufacturing while sales may be made through the spring, summer and fall months, besides getting rid of the distrust of the buying public that new models or lower prices will be announced at any time during the year.

With a 22 per cent increase in paid attendance for opening night over 1914, the best previous year, the total attendance for the week was 12 per cent better than for last year's show. On Wednesday the receipts fell off, due to the subway tie-up, resulting in a slight decrease in the figures for the day, as compared with the corresponding date of last year, though this was more than made up on Thursday when the largest attendance in the history of the show for 1 day was registered, being 20 per cent in advance of the highest previous figures.

New directors were elected at the twelfth annual meeting of the Motor and Accessory Manufacturers, which was held at the Waldorf-Astoria, January 6. Reports were read by the retiring president, treasurer and chairmen of the various committees, following which E. H. Broadwell, of the Fisk Rubber Co.; Christian Girl, of the Perfection Spring Co., and E. W. Beach, of the Manufacturers' Foundry Co., were elected as members of the board of directors to serve for 3 years and to succeed those whose terms had expired.

L. W. Wainwright was re-elected as a member of the board of directors to serve for 3 years. Directors who declared themselves unable to accept re-election were: H. T. Dunn, of the Fisk Rubber Co.; F. C. Billings, of the Billings & Spencer Co., and E. S. Fretz, of the Light Mfg. and Foundry Co. William M. Sweet continues as manager.

At the meeting of the board on the following day these officers were elected to serve for the term of 1 year, all of them being board members: President, F. Hallett Lovell, Jr., Lovell-McConnell Mfg. Co., Newark, N. J.; first vice-president, C. W. Stiger, Stromberg Motor Devices Co., Chicago; second vice-president, C. E. Thompson, Electric Welding Products Co., Cleveland, O.; third vice-president, T. J. Wetzel, Dyneto Electric Co., New York city; treasurer, L. M. Wainwright, Diamond Chain and Mfg. Co., Indianapolis, Ind.; secretary and assistant treasurer, Alfred F. Sloan, Jr., Hyatt Roller Bearing Co., Newark, N. J.

NATIONALIZING USED CAR REPORT

New York, Jan. 7—The Chicago Automobile Trade Association, the local organization of motor cars and accessory dealers, took its first active step today in its endeavor to nationalize its Used Car Central Market Report, which it has been issuing for several months, and which is a complete report of prices at which used cars have been sold in the Windy City, by a luncheon given at the Engineers' Club, in this city, and attended by approximately forty car dealers from this city, Boston, Buffalo, Syracuse, Rochester, Brooklyn, Newark, and other eastern cities. The object of the meeting was to lay the plan before the eastern dealers in order that they might take it under consideration in their local organizations.

As a result of today's luncheon, this used car market report will be considered by the different dealers' organizations represented with the possible thought of cooperating with the Chicago organization in furnishing prices of used cars sold in the different eastern cities, these to be incorporated in the quarterly market report, thereby giving national scope to the work.

The Chicago association was represented by President H. M. Allison, Treasurer Henry Paulman and Director C. W. Stiger. President Allison outlined the plan of nationalizing these quarterly market reports by having the different dealers' associations furnish the prices at which their used cars are sold, and incorporating these prices in their reports. In order to make this possible the country was divided into zones corresponding with those of the federal reserve. This was found unfavorable in New York as the metropolitan area was divided among three different zones, and if the book were to be nationalized different zones would have to be marked out.

Alfred Reeves, general manager of the National Automobile Chamber of Commerce, was heartily in favor of having the Chicago movement taken up in the east.

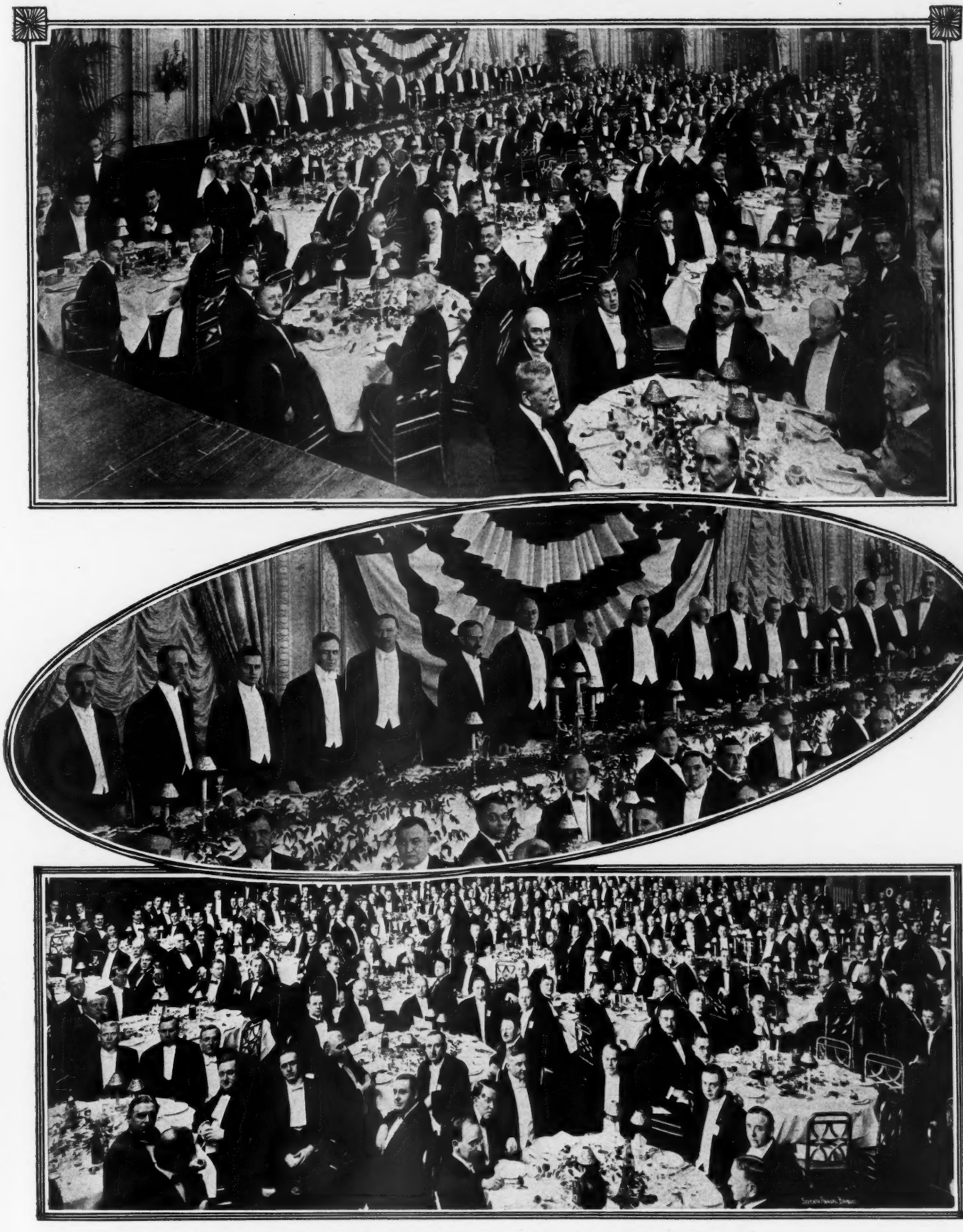
E. P. Chalfant, secretary of the Electric Automobile Manufacturers' Association, has been working with the dealers in nineteen cities endeavoring to show them why more sane allowances must be made for used electrics, and was of the opinion that practically all of the dealers were holding their own cars too long, with the hope of getting high price, but were finally compelled to sell at a sacrifice. He was heartily in favor of the used car market report and was using his efforts to have all dealers selling the electrics he represented to use such reports.

NEW YORK GARAGEMEN ORGANIZE

New York, Jan. 9—About twenty representative garagemen of New York state at a meeting in New York city last Wednesday, formed the United Garage Association of New York state. William Haradon, Royal garage, New York, was chosen president. The other principal officers are: First vice-president, John Van Benschoten, Poughkeepsie; second vice-president, W. D. Sweet, Knickerbocker garage, Binghamton; treasurer, A. H. Dudley, Dudley's garage, Rochester; general secretary, Harry Waring, New York. The organization work leading up to the meeting was done by Waring who aims to have the association represented in Chicago, January 27 and 28, at the meeting which has been called by the Garage Owners' Association of Illinois for the purpose of forming a national body to be known as the Associated Garages of America.

VAN ALSTYNE ADVERTISING MANAGER

New York, Jan. 13—T. B. Van Alstyne has been appointed advertising manager of the Class Journal Co., publisher of Motor Age, with headquarters at 239 West Thirty-ninth street, this city.



TWO OF THE BIG BANQUETS HELD DURING THE NEW YORK SHOW

In the upper illustration is shown the annual banquet of the National Automobile Chamber of Commerce. The center oval is an enlargement of the speakers' table at the same banquet, showing from left to right: E. R. Benson, H. O. Smith, R. D. Chapin, A. G. Batcheider, C. C. Hanch, Wilfred C. Leland, James H. Foster, Colonel George Pope, Irvin S. Cobb, Charles Clifton, John A. Wilson, Hugh Chalmers, H. M. Leland, Thomas Henderson, Alvin McCauley, Windsor T. White, William E. Metzger. The lower illustration shows the banquet of the Motor and Accessory Manufacturers.

S. A. E. Accomplishes Much at Its New York Meeting

Tire Sizes Reduced in Number to Eighteen

NEW YORK, Jan. 9—The Society of Automobile Engineers last night closed a successful and interesting 3-day meeting with a session which lasted until midnight and adjourned with some of the papers unheard and some of the questions unsettled.

As reported in Motor Age, January 7, W. H. Van Dervoort was elected president for the ensuing year. The work accomplished of most importance to the car owner was the reduction of tire sizes, to eighteen instead of the former fifty sizes. There are to be now nine regular sizes and nine oversizes.

It was decided that the summer meeting should be held on a steamer on the Great Lakes, as was done year before last.

Other work of value of the meeting was the reduction of the number of steels in the standard list; recommendations for standard insulation practices and the definition of single-wire and two-wire systems; reduction of lock washer sizes, further standardization of carbureter fitings; standardization of frame members; dimensions for yoke and rod end pins; standardization of ball and roller bearings; an outline for a standard parts list and the nomenclature of cantilever springs.

Concentration of motor car production in a few mammoth manufacturing companies was the prediction made by Henry M. Leland, of the Cadillac company, ex-president of the S. A. E. in his address of welcome to the engineers. He said for the future he saw that the number of manufacturers of motor cars has about reached its maxmum, and that it will constantly decrease until but a comparatively few immense plants will supply the entire world with motor-driver vehicles of every type and nature. He continued:

Every one of the 130 or more American plants has its own corps of engineers. Some need more than others Should these plants become materially less in number, there will be a substantially less number of motor car engineers required as designers. Then what will those engineers do who are displaced as

Cantilever Springs As Discussed at S. A. E. Meeting by John G. Utz

ALTHOUGH the introduction of the cantilever spring in America is of comparatively recent origin, the idea of this is not new, having been in use some 10 years on the Lanchester car in England, which machine has the distinction of using worm drive in the rear axle for approximately the same period. Lanchester is thus the father of the cantilever spring as well as worm gearing as applied to motor cars.

The Lanchester spring is not exactly the same as the cantilever type used in America. As Fig. 1 shows, it employs a combination of links L one above and the other below the spring, to impart a vertical motion to the axle to avoid shuffling of the tires when the axle moves with relation to the frame of the car. These links also take the drive from the axle to the frame and absorb the torque, or tendency of the rear axle housing to rotate, due to the internal drive.

The use of cantilever springs in America does not employ this exact link motion L thereby causing some confusion as to the name of the spring. When the cantilever spring is used on a car the weight of the metal in the spring is carried on the frame of the car rather than on the housing axle. This reduced what is known as the unsprung weight of the axle and is supposed to be correspondingly easier on tires. The name half-elliptic cantilever is the best to describe the type of spring used in this country.

The attachment of the cantilever spring to the rear axle has been the source of a great deal of difficulty, due to the fact that many designers have been using the semi-elliptic spring or the double purpose of suspension and radius rods; whereas, others have made the semi-elliptic spring perform three works, namely, suspension, radius rods for transmitting the drive from the axle to the frame, and torque arms to absorb the tendency of the rear axle housing to rotate.

Editor's Note—John G. Utz is consulting engineer of the Perfection Spring Co., Cleveland, O. This is an extract of his paper presented at the annual meeting of the Society of Automobile Engineers, New York, January 6 and 7.

Different methods of attaching the cantilever are shown in Figs. 2, 3, 4 and 5. When the cantilever spring is called upon to take suspension only, it is possible to merely let the spring end rest on a roller according to the method employed by Lanchester, Fig. 1.

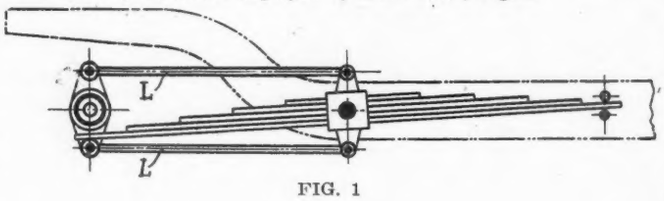


FIG. 1

When thus attached, separate means to control the path of the rear axle and transmit the drive and torque must be provided, similarly to the way shown.

An alternate method is shown in Figs. 2 and 3, the carrier bracket being free to rotate on the axle tube, torque and drive being provided for by separate devices.

When there is a desire to use the spring as a radius road to transmit the drive as well as suspend the load, a device like that shown in Fig. 4 has been employed. With such a device the bracket must be free to rotate on the axle tube, with a separate member to take the torque reaction. The chief difficulty with the Fig. 4 construction is that only one spring leaf can be attached firmly to the axle bracket, since the adjacent leaves must be free to move longitudinally with respect to each other. It follows that should fracture of this one leaf occur, a serious accident would be liable to result. A construction such as is shown in Fig. 5 permits transmission of the drive without the objectionable features of the Fig. 4 type. If a main leaf should fracture in this construction, the other eye leaf would hold the axle, all the leaves being left free to move in a longitudinal direction with respect to each other. In Fig. 5 the bracket is free to rotate on the axle tube and the torque is taken by a separate member. It is quite likely that the construction shown in Fig. 5 would take the torque reaction, where the bracket made fast to the axle tube, but such severe angular distortion would be required of the universal joints as to make this function impracticable. Another advantage in this construction is that it permits the spring to be placed quite close to the axle.

In order to obtain the best results from a cantilever when it is employed to transmit the drive, the main leaf of the spring should be straight and parallel to the ground under normal load, as in this position the axle will move in substantially a vertical path; the driving effort will be exerted in a horizontal plane without tending to lift the car, deflect the spring or separate the leaves. Having the main leaf straight under normal load has also the advantage of giving the greatest length of spring possible, which in turn means that the spring stiffens when it shortens upon further deflection.

It is obvious that when cantilever springs are employed, the portion of the chassis frame extending bac kof the trunnion bearing, is unsupported. Therefore, the frame must be so designed and constructed that it will perform its proper function without distortion.

This point may seem to be out of place in this discussion, but the fact remains that many designers have condemned the cantilever spring because a frame constructed for the other types of springs is not suited for cantilevers.

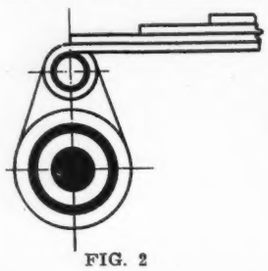


FIG. 2

FIG. 3

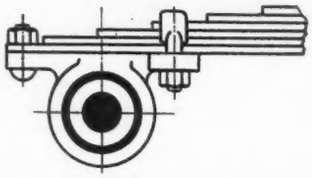


FIG. 4

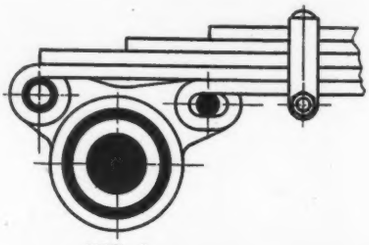


FIG. 5

H. J. Hayes' Paper As Read at S. A. E. Meeting Recently Held in New York

Editor's Note—Extracts from paper presented at annual meeting of Society of Automobile Engineers, New York, January 6 and 7. H. J. Hayes is president of the Hayes Mfg. Co., Detroit, Mich.

METAL motor car bodies have already been in use long enough to show that they are entirely satisfactory. One metal body which was exhibited in Chicago in 1899 was stored for 15 years and is today in excellent condition, the enamel applied 15 years ago still being in good condition. The first patent for an all-metal body was taken out in 1899. The body was built for an electric car and proved very satisfactory.

Gradually metal is taking the place of wood in body building, the same as in railroad car construction. Some of the largest motor car manufacturers are using all-metal bodies and it will only be a short time before the majority of all medium-priced cars will be equipped with all-metal bodies finished with enamel baked on with high temperatures, thus saving much time in painting and making a much more durable finish.

The steel sheets now being made for the motor car industry are the finest sheets in every way that have ever been manufactured either in the United States or abroad. The steel employed is selected with the greatest care, after being made from materials specially selected for the purpose. It is essential that the chemical composition and the physical structure be such as to permit of developing the high finish necessary. There is no question that sheet steel rusts more quickly now than it did many years ago, because of the increased use of carbon and manganese in it to obtain a smooth surface for connection.

Composite bodies have an advantage not possessed by wood bodies. High-grade lumber necessary for body panels has become scarce. This fact, together with the tendency to check or split on account of extremes of heat and cold, made a very serious situation, especially in large production. Many a manufacturer has spent several days in finishing and varnishing wooden bodies in rooms of high temperature, only to see panels split or check upon being exposed to the cold when loading on freight cars for shipment.

Sheet-metal bodies do not require one-third the paint a wooden body does to obtain the same finish, and the cost of painting is much less. Fewer coats are necessary on metal on account of a filler not being required, as on wood. Some body manufacturers are enameling the sheet metal before applying it to the body, baking the enamel at a high temperature, making a very durable and satisfactory finish for medium-priced cars.

The perfect motor car body sheet must be hard and soft at the same time. It must possess high tensile strength and great ductility. Only a mirror-like surface is accepted and oftentimes that surface is subjected to microscopic inspection.

Body, fender and radiator sheets no longer belong to the same family. They may look alike, but the basic ingredients and qualities are radically different. Steel to be used for pressing or stamping must be soft enough for drawing without crocking or straining the metal too severely. Usually the stampings for tonneau backs are made in three pieces, as also for the shroud or cowl, and then joined together by spot-welding or acetylene welding and afterward soldered and smoothed off to make a good joint. Invariably it is necessary to bump or hammer these parts, which naturally hardens the metal, causing crystallization later. While this has apparently been satisfactory, a great deal of care is necessary in preparing the metal for painting. Painters do not like anything that looks like solder. Occasionally trouble arises after the body has been used a short time, on account of opening at the joint, or the paint coming off, attributable possibly to imperfect cleaning of the metal.

Some wonderful press operations are now being conducted, eliminating practically all the above difficulties and crystallization, etc. One-piece stampings of back seats and cowls are now being made very satisfactorily in one operation. The one-piece stampings make a complete body shell containing practically four pieces, as follows: Tonneau, cowl and two side panels, as against eight pieces with the other construction. Less wood framework is necessary, as the metal has more rigidity and less weight. The metal is also less expensive to finish.

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one after another of these plants is diverted to some other industry?

I can see two great opportunities for the engineers who will be thus liberated from motor car designing should my prophecy become history. First—The converted plants will be re-equipped and effectively operated to supply the constantly growing demand for other necessities. New devices must be brought into being to keep pace with and to supply the need for all the material things which are constantly increasing and which our continuously refining civilization demands, not only for the daily wants and material needs, but for the uncountable means to supply the ever-increasing desire for culture, refinement and all that goes to make up that highest civilization which this country is ever reaching after. Supplying this demand of the future will mean increased enlargement of our miscellaneous industries and will call for men of your engineering skill, experience and training. And it only remains for the motor car engineer to qualify and prepare himself for this enlarged field of opportunity.

Future of Engineers

Second—Most of the engineers of the future who remain in the industry as a part of one of the few large plants will apply their training and ability to scientific manufacturing rather than to scientific designing. Here is the great opportunity of the future for the motor car engineer. May I outline my conception of the characteristics of such motor car plant as will stand the stress of time, and of the manufacturing opportunity in such a plant for the motor car engineer? The motor car plant of the future will have the proper combination of capital and brains, correlated to the right ideals and standards. It will produce such a car in design, efficiency, quality and price as will insure a large volume of business, because the requisite conditions cannot continue permanently without plenty of capital and a large volume of business.

In commenting on the growth of the society Ex-President Leland stated that during the last fiscal year 306 were added to the membership. Year by year its growth has been as follows: 1912, 1,252; 1913, 1,611; 1914, 1,804.

A number of papers were presented, some of which were productive of lively discussions. Three of the papers were given in Motor Age, January 7 and excerpts from others are presented on these pages with some of the discussions on them.

That the S. A. E. is working on a standard table of proper tire sizes for different car weights and which would be designed to go with the standard tire inflation table, was brought out in the discussion of the paper on "Pros and Cons of Tire Inflation," printed in Motor Age, January 7. It was said further that the Clincher Automobile Tire Manufacturers' Association was devoting a great deal of effort to the determination of a proper basis for such a table. There seemed to be a tendency to base the work more on the percentage of deflection of the tire and to produce a table which would let the user know what mileage can be expected from a tire which is run with various percentages of deflection. Thus, the owner could carry a pressure which would give him the easiest riding but he would be warned that by carrying the pressure low enough to give too great a deflection the life of the car would be shortened. It also brought out the fact that one tire company has suggested calipers designed for determining the minimum allowable inflation. These calipers simply are limit gauges for the tire and automatically indicate whether or not the deflection is too great for safety.

Discovering Under Inflation

In the general comments on the prevalence of under-inflation among owners the experience of one concern was given who sent out testers one night to check up the pressures in tires in garages at night. Two hundred and fifty tires were tested in one night with accurate gauges with the result that an average under-inflation of 26 per cent was found. The worst cases were the 37 by 5 and the 34 by 4.

Relative merits of wood wheels and wire wheels were next discussed at length. R. B. Mudge, chief engineer Hayes Wheel Co., holding the brief for the wood wheel and George W. Houk, of the Houk Mfg. Co., upholding the wire wheel end of the discussion. The two papers presented were given in Motor Age, January 7.

It would seem that the results given in these two papers were based on two separate tests, neither of which was official and neither of which gave results which may be considered conclusive. Mr. Houk maintained that the wire wheels in the test referred to by Mr. Mudge were of an out-of-date pattern and were improperly constructed, that they were not at all representative of what the present-day wire wheel could do.

Discussing Breaking Strength

It seemed to be the opinion of most of the engineers present that in the two papers presented too much stress had been laid on the question of breaking strength of the wheels under the static load produced by the testing machine; that wheel testing methods had not been developed to a point where the results were productive of actual workable data of value.

In the discussion of the paper on motor car bodies which is printed on these pages, brought out the fact that 2,800 to 3,000 bodies had been completed in which an all-metal construction is used with connection to the sub-frame. The bodies were made in three pieces and proved to work out very well. The only wood used in the entire construction was for the doors, the door bumpers and trim rails. In addition a small amount for use in the upholstery work was also employed.

The cantilever spring paper, which is reproduced herewith, was the subject of written communications by several members of the society, all of them denied practically every premise taken by the author. The consensus of the written criticisms was that the flexture figures were inaccurate and not borne out in practice. The stiffness figures also were criticized. It was stated by several that the entire procedure in making the calculations in the paper was based on false premises. It was pointed out that there was no difference in the action of a cantilever as compared with a semi-elliptic, three-quarter, or any other type of spring so long as the deflection curves are similar; that the deflection of the curve of the average motor car spring is straight.

This curve referred to is the curve of deflection per given load. Ever since springs have been designed, men have been trying to secure a curve of deflection which would start with a gradual slope and then increase until a certain point, at which it would become vertical. The vertical portion of the curve would mean the point at which no further deflection was given regardless of what load was applied. It was suggested that probably the great increase in the use of cantilevers was due to the greater deflection allowed by this type of spring.

Government Reports November Exports and Imports

Count Shows 842 Trucks and 776 Cars Shipped Abroad

WASHINGTON, D. C., Jan. 12—Eight hundred and forty-two commercial cars valued at $2,244,518 and 776 pleasure cars valued at $634,659 were exported in November last, as against sixty-four commercial cars, valued at $105,501 and 1,707 pleasure cars, valued at $1,676,726 exported in November, 1913.

During the 11-month period of commercial cars increased from 921, valued at $1,586,147 in 1913 to 2,151, valued at $5,598,027, in 1914, while pleasure car exports declined from 23,579, valued $23,291,160, to 21,038, valued $18,523,010.

Interesting figures are presented in the latest export figures as a result of the European war. For instance, in November, 1913, France imported eighty-seven cars, valued at $63,641, from the United States, while in November last the number had increased to 695, the value of which was $1,714,145. On the other hand Germany took sixty-nine cars, valued at $35,827, in November, 1913, while in last November the records show that not a single car was sent to Germany.

Italy also shows a big decline in imports of American cars, twenty-five, valued at $17,899, being sent there in November, 1913, while in November last the number had been decreased to two, the value of which was $8,360. The United Kingdom was a big customer in November last, importing 404 cars, valued at $683,496, while in November, 1914, the number was 321 and the value $297,771.

Other European countries, evidently as a result of the war, failed to import American motor cars to any extent, the figures showing that in November last, the exports to "other European countries" numbered twenty-two cars, valued at $24,256, as against 121 cars, valued at $80,216, exported there in November, 1913. Canada, another good customer of the United States, likewise failed to take the usual number of cars, the figure showing the exports to that country declined from 266, valued at $396,753, in November, 1913, to 105, valued at $133,103, in November last. South America, British Oceania and Asiatic countries also showed marked decreases in the imports of American motor cars for the month.

Walter Austin Wins Two-Speed Rear Axle Patent Suit

Michigan Court Decides Against Cadillac Company

GRAND RAPIDS, Mich., Jan. 9—A decision in favor of Walter S. Austin, of the Austin Automobile Co., against the Cadillac Motor Car Co., Detroit, was rendered yesterday in the suit of Austin against the Cadillac company, charging the latter with infringement of the two-speed axle which was used by the Cadillac company during 1914. District Judge C. W. Sessions has declared the Austin patent claims valid and also infringed and the decree will be entered granting an injunction and ordering an accounting. The plaintiff will recover costs. It is thought that the Cadillac company will appeal to a higher court.

This suit for infringement was started in July, 1914, by Mr. Austin who claimed that the Cadillac company had been infringing patent No. 1,091,618, issued to him March 31, 1914.

The court's decision analyzed the case at length and affirms that "The invention belonged to the plaintiff and not to the defendant" in referring to the two-speed axle construction.

Further: "Defendant's (Cadillac) two-speed mechanism is almost an exact copy of plaintiff's patented structure except as to two changes or modifications; probably made for the purpose of avoiding infringement . . . these changes or modifications, however, are not material upon the question of infringement of the claims hereunder considered. In plaintiff's (Austin) machine one of the gears upon the rear axle is secured to the differential housing and the other gear is loose and revoluble independently of the first, and one of the pinions is loose upon the propeller shaft and is revoluble independently of the other one.

"In defendant's machine the two gears upon the rear axle are secured to each other and to the differential housing, while both pinions upon the propeller shaft are loose. This change made necessary a further change in the clutch which operates to engage and disengage the gears. Plaintiff's (Austin) clutch is necessarily doubled with a lever connection, one operating the loose gear upon the axle and the other the loose pinion upon the propeller shaft. Defendant's (Cadillac) clutch is a single one of the sleeve pattern operating the two loose pinions upon the propeller shaft. It may be conceded that defendant's device is an improvement upon that of the plaintiff but mere improvement does not avoid infringement . . . That the plaintiff made a distinct step in advance of the prior art cannot be denied . . . His two-speed direct drive mechanism can be and has been successfully used and operated . . . In its efforts to show an anticipation of plaintiff's claimed invention, defendant has cited and referred to seventeen patents foreign and domestic. Each is for a combination . . . some of these patented structures have existed only upon paper, others have been found inoperative and none of them contain all of the essential elements of the plaintiff's combination. Probably the most prominent feature of plaintiff's combination is 'the outer gear and pinion being of higher ratio than the inner gear and pinion.'"

Wilfred C. Leland, general manager of the Cadillac Motor Car Co., made the following statement concerning the decision rendered:

"It always has been the policy of the Cadillac company to be extremely liberal in interpreting the rights claimed by others. If, in our judgment or in the judgment of our attorneys, the Austin claims were entitled to consideration, that consideration would have been granted without controversy. The decision which has been rendered does not alter the rightfulness of our contentions in the matter and therefore, it is our intention to appeal the case."

Two More American Eight-Cylinder Cars Announced

Regal and Ross Manufacturing the New Type

DETROIT, Mich., Jan. 13—Special telegram—Two more eight-cylinders were announced today—the Regal at $1,250 and the Ross at $1,350. The latter marks the advent of an old parts-making concern into the car manufacturing business.

The Regal company expects to have at the Chicago show the two new cars which will feature the line for the coming year. These are an eight-cylinder design to sell at $1,250 and a small four-cylinder type at $650. Both are to be either in roadster or touring form.

The eight is a 40-horsepower car with a 2⅞ by 4½ V-motor, the two blocks of four cylinders being at 90 degrees in the crankcase. The usual eight-cylinder practice will be adhered to, the crankshaft having four throws and two rods connecting to each. Silent chain drive for the camshaft is used, and the only thing between the blocks is the Stewart carbureter, which is fed by the Stewart vacuum fuel feed. The starting and lighting is by two-unit system with the generator driven by silent chain from the crankshaft with 1 to 1 ratio. The ignition distributer is a part of it. The starting motor gears to the flywheel with 30 to 1 reduction. The oiling is force-feed through the crankshaft and the connecting rods.

This motor is interchangeable with the regular Regal four-cylinder engine in the standard regal chassis. The wheelbase is 112 inches, the gearset in unit with the rear axle which is three-quarter floating, and the propeller shaft is inclosed in a torque tube. Tires are 33 by 4 and rear springs three-quarter elliptic.

The small four-cylinder type has a 3⅜ by 3¾ block unit power plant, the three-speed gearset in unit being a new feature to Regal construction. The electric cranking and lighting is by a single-unit system, the drive for it being through a silent chain to the crankshaft. Other specifications include 106-inch wheelbase, 30 by 3½ tires, cantilever rear springs, and floating rear axle.

The Ross & Young Machine Co., prominent in the parts and machining business of the city and heretofore concerned in the making of motor cars for another concern, has entered the car-making business itself with the Ross eight, which is to sell for $1,350 in five-passenger touring car form.

The eight-cylinder engine is made by the concern in its own factory and has the usual two blocks of four cylinders arranged on the common crankcase at an angle of 90 degrees to each other. The cylinders have a bore of 3 inches and a stroke of 4½ inches, and there is nothing in the V between the two blocks except the carbureter.

The camshaft is above the crankshaft and drives through silent chain. The crankshaft, a three-bearing type, is the same in form as that used in the eight already brought out in that the connecting rods attach to it in hinge-fashion; that is, two rods attach to the same crank bearing, one having a yoke end, and the other fitting within the yoke arms.

The Stewart vacuum system of fuel feed is employed, and oiling is by force feed to the cylinder walls, the crankshaft and the camshaft. The starting and lighting equipment is of the single-unit type, the combined motor generator being placed on the gearbox and driving through silent chain to the flywheel with a 3 to 1 reduction.

The motor is a three-point suspended type and by having the three-speed gearset integral with it forms the usual unit power plant design. Other specifications of the car are 115-inch wheelbase, 34 by 4 tires on wood wheels, open drive shaft fitted with two Spicer universals, Timken front and rear axles, the latter being a floating construction. The rear springs are very long, three-quarter elliptics. The finish of the Ross car is very attractive, the upholstery used upon it being Spanish leather.

John L. Ross stated today that his concern is taking steps to perfect a dealers' and sales' organization, and that from 500 to 1,000 cars are to be marketed this year. The plant has a capacity of 3,500 cars, but no attempt is to be made to reach that number. The concern is bending every effort to have a car at the Chicago show, but this has not been yet definitely decided.

Packard Company Ready with New Line of Trucks

One-Ton Model Makes Debut Into Light-Duty Field

THE Packard Motor Car Co. has just made known the details of its entirely new line of motor trucks which range in capacities from 1 to 6 tons. These have been in the process of development for 3 years and differ from anything Packard has heretofore turned out in a number of respects. They have overhead-worm drive, and the control is centralized below the steering wheel and on the steering column which feature also characterizes the passenger vehicles of Packard make.

The 1-ton model marks the entrance of the big company into the field of the light-duty vehicles, it never having produced so small a vehicle before. A point is made of the fact that each of the six models is a separate engineering design, and that for this reason they do not all adhere to exactly the same construction, although in the main they are all built along the same lines. The 1-ton is somewhat differently constructed from the 2, 3 and 4-ton types, while the 5 and 6-ton models may also be classed as being in another group.

The details of the 1-ton and the two heavier models, the 5 and 6-ton are not completely divulged at this time, but specifications of the 2, 3 and 4-ton are available, however. In general, though, they all incorporate four-cylinder block-cast engines which are three-point suspended. They have left drive and left control levers, shaft drive direct to the worm and three speed gearsets. They are automatically governed, and provision is made for the equipping of lighting and cranking by electricity if desired. Another feature is the power take-off which makes it a simple matter to drive independent mechanism by the truck power.

The 3- and 4-ton models have a 4½ by 5½ motor of 32.4 S. A. E. horsepower. It has four-bearing crankshaft and camshaft, and incorporates a multiple dry-disk clutch. The drive is through the Packard progressive three-speed gearset which is amidships to the worm gearing. The worm is of the straight type and of steel while the wheel is of bronze. Timken bearings are used in the axle construction which is of the floating form. The frame is a channel section and suspension by semi-elliptic springs all around. The wheelbase of either model is 13 feet standard, or 15 feet 6 inches optional. The 3-ton has 36 by 5 tires, and the 4-ton the same size front tires and 40 by 5 rear. The rear set are duals in either case.

The 2-ton has a 4 by 5½ engine of 25.6 horsepower S. A. E. rating and adheres to the same general design throughout as the 3- and 4-ton types. Its wheelbase is 12 feet standard, or 14 feet in the long size, while tires are 34 by 4 with the rear dual.

The price of the 2-ton truck is $2,800; of the 3-ton, $3,400; and of the 4-ton, $3,800. If the Packard-Bijur system of lighting and cranking is fitted at the factory, it adds $225 to either of these figures.

The outward appearance of the new Packard series is much the same as the older models. The motor is placed forward of the driver's cab.

It is expected that the engineering department will have given its O. K. to the 5- and 6-ton models by the end of February, and that in 3 or 4 weeks, the details of the 1-ton will be forthcoming.

Predict That Quest for Practical Fender Will Be Futile

Safety Device for Trucks Not Feasible, Makers Claim

POLICE officials of Chicago recently started a quest almost as difficult as that attempted by Diogenes, who, it will be recalled, spent all of his inquisitive life, except when he was trimming his lantern wick and sleeping in a bath tub, roaming the ancient world over in a futile search for an honest man.

The guardians of the peace of the western metropolis are not engaged in an epochal man hunt. They seek no international crook, no wholesale murderer, no kidnaper of a millionaire's child. They have been invested with new powers, involving technical investigation and not deductive reasoning. They have been ordered to pass upon the practicality of a safety fender with which all motor trucks and delivery wagons must be equipped by March 1, according to an ordinance passed by the city council in October, 1914.

That the police officials will be about as successful in their quest for a practical fender as was Diogenes in his search for an honest man is a common prophecy. Attempts to find a device that would safeguard human life without interfering with the operation of the vehicle and impeding traffic were futile in Detroit, where a fender ordinance was enforced for a short time last year only to be rescinded. When the truck fender was shown to be impractical in Cleveland and Buffalo, where the aldermen were considering a safety measure in 1914, pending legislation was defeated, the opposition being furnished by the commercial vehicle dealers and users and the campaign directed by the Pierce-Arrow Motor Car Co.

Dummies Maltreated in Tests

The tests of several appliances conducted in Chicago to date have failed to disclose one fender that meets all of the varied requirements of the Chicago ordinance. Several rescues of sawdust-stuffed dummies have been exceedingly spectacular and might thrill the movie fan if registered on a film and projected on a screen, but the practicality of the devices—their certain operation in each and every emergency, their ease of release, the question of sufficient road clearance—is seriously interrogated. And the tests have been exacting, the three sizes of dummies that are used being struck when in thirteen different positions and at various speeds ranging from 3 to 15 miles an hour. In fact, the dummies are gluttons for punishment, to resort to the patois of the prize ring, being bowled over from 120 to 150 times in the test of each fender.

Were the belief not so common that a practical fender will not be discovered in Chicago, manufacturers, sellers and owners of commercial vehicles would be more vitally interested in the efforts of the Chicago police to unearth such a device for the safety of pedestrians than they are. For municipalities are imitators, and should Chicago decide that its fender ordinance is feasible and insist upon its strict enforcement, measures of a similar nature would spring up in all the large towns and cities like mushrooms in a boggy field after a night of rain. The passage and enforcement of fender ordinances in the great centers of population would necessitate the expenditure of a small fortune for such safety appliances and might result in fenders being made stock equipment on all trucks built in the future. To purchase fenders for the 100,000 motor-driven commercial vehicles now in use would cost no less than $1,500,000 and perhaps as much as $2,500,000, for the price on such an appliance ranges from $15 to $25, according to advices from Detroit, where hundreds of fenders were bought immediately after the passage of the ordinance.

Claim Fender Makers Started Agitation

Because of the large amount that would have to be expended for safety equipment of this nature should the fender hysteria, now confined to Chicago, spread over the country, there appears to be much sound reason in the claim generally made that makers or prospective makers of such devices are directly responsible for the campaign and that they are playing the role of the diplomatic cat of the fable and using the Safety First movement as the monkey to pull the hot chestnuts out of the fire.

The claim also is made that it is unjust to require only motor trucks to carry fenders. If such devices are necessary to decrease the number of traffic accidents, passenger cars as well as commercial vehicles should be so equipped, it is contended, since statistics show that the former figure in more injurious and fatal collisions with pedestrians than do the latter, even when the vastly greater number of passenger cars than trucks now operated is taken into consideration. Although they are far heavier, trucks rarely equal the average speed of the passenger car and speed is responsible for more accidents than weight, according to the opponents of commercial vehicle fenders.

Believing that the subject of fender equipment on motor trucks, as demanded by the Chicago ordinance, is pertinent at this time, Motor Age recently asked the various manufacturers of commercial vehicles for their opinion on the general use of such an appliance. Answers to the following questions were requested: "Do you think that fenders are necessary? Can they be made practical? Should they be made stock equipment? What is your idea of a practical fender? What method of test would you suggest?" That fenders are unnecessary and impractical and should not be made stock equipment was the opinion expressed, almost without exception, by the makers. The arguments in support of such contentions is printed herewith.

John Younger, chief engineer of the truck department of the Pierce-Arrow company, quoted from the philippic issued by that concern at the time when fender ordinances had either been passed by the city councils or were pending before the aldermen of Chicago, Cleveland and Detroit.

"Truck fenders have to be operated under the most varied conditions," reads the Pierce-Arrow pamphlet of protest, "and very many fenders, which would seem to be valuable, are actually more dangerous than if they were not used.

"A fender, designed by a well-known fender company, projects 28 inches in front of the truck and is 6 feet 6 inches wide. This adds 10 per cent to the overall length of our 5-ton truck and 15 per cent to our 2-ton truck. This is objectionable as it is added at a point in front of the driver. On our 5-ton truck, the driver's eye is 11 feet away from this fender's extremity and, because the radiator, mud guards, etc., are in his way, he is not able to judge of the wisdom of dropping his fender or not.

"Again, how is the driver to drop the fender? One hand is on the steering wheel, the other at the brake lever; one foot on the clutch pedal and the other on the brake pedal. He must be a cool, wise-headed driver who would remember what to do in an emergency.

Dangerous in turning Corners

"To our mind, the greatest danger lies in the projection of the fender when turning curves. The driver's attention is directed at right angles to where his fender is probably breaking a traffic policeman's ankle. Besides, one wheel is left unguarded at this operation. On our 5-ton truck, a straight fender nearly 13 feet wide would be required to thoroughly guard the truck. A curved fender would be somewhat shorter but horribly complicated.

"A device that does not fit closely to the ground is not a lifeguard—it is a trap. It is practically impossible to drop a fender closely to a rough road without it being damaged by the road to such an extent that it is quite conceivable it would present a jagged, spiked weapon to the unfortunate victim instead of a comfortable couch.

"Most people would rather take a chance and take advantage of the 12-inch clearance between the wheels of a truck than of being hit by any fender yet seen. A fender would certainly trip them up and throw their heads against the radiator

with some force instead of rebuking carelessness in a gentle manner."

In preparing the pamphlet, Engineer Younger, wrote to Chief Engineer Iden, of the London General Omnibus Co., which runs about 3,000 motor buses through very congested traffic, to learn of his experience with fenders. Mr. Iden replied as follows:

During the past year we have made up and tested a number of front guards, but we regret to say that up to date we have not found one efficient enough to warrant fitting to our buses.

The early types of lifeguards, which we tried, were more in the nature of fenders or gates, but these were found unsatisfactory in cases where a person had fallen prone, when the limbs invariably were drawn under the guard, and more damage was done than if there had been no guard and they had been run over by the wheel.

We have tried a trip guard similar to that used on tram cars, but this, to be effective, had to have too great a projection to allow us to adopt such a device.

"We do not believe fenders on commercial vehicles are necessary," wrote H. D. Church, truck engineer of the Packard Motor Car Co., "and our experience has been that fenders of motor trucks are absolutely impractical. It is impossible to make a practical fender unless the design is such, particularly as regards road clearance, that its value as a safety appliance is entirely lost.

"It would be our opinion that tests similar to those made with street car fenders would establish the value of different designs as far as their protection to life and limb was concerned. After testing in this way, successful designs should further be tested in actual service with the fenders in their operative positions. It is our opinion that if this is done it will be found that the fenders, which are satisfactory as life saving devices, will be constantly broken or damaged by contact with the road or with curb-stones, man-hole covers, railroad tracks, etc.

Found Impractical in Detroit

"The city of Detroit passed a motor truck fender ordinance about a year ago, and this company submitted several designs of fender to the police commissioner in an endeavor to obtain his O.K. on a fender. The regulations in Detroit called for a minimum clearance between the road surface and the fender on a smooth road of not more than 5 inches, and it was specified that all fenders should be carried in operative position, or, in other words, not more than 5 inches off the road at all times when trucks were in motion.

"We found that a fender to meet the above requirements was continually coming into contact with the road or with obstructions, that it seriously interfered with the turning of the truck in close quarters. It is our opinion that a fender extending across the front of a motor truck is, unless practically in contact with the road surface at all times, more of a menace to life than if the truck were not so equipped.

"There is no more necessity to put fenders on motor trucks than to put them on horses and wagons. With the traffic congestion in our large cities today, accidents are bound to happen, but it is our opinion that the safest and surest prevention lies in the education of the public, both adult and juvenile, and the furnishing in our large cities of suitable play grounds, so that children will not be forced to play in the streets."

E. B. Finch, general sales manager of the Standard Motor Truck Co., stamped the fender as unpractical in the following words:

"It don't seem to me that these contrivances are necessary on motor trucks. In the first place, a motor truck does not run anywhere near the speed that a pleasure car does. Most of the accidents I have noticed with motor trucks have not been where a truck has run into something with its front end, but where children have been playing and have been run over by the rear wheels. The percentage of accidents with motor trucks is away below that of pleasure vehicles, even taking into consideration the difference in the number in operation. Personally, I do not know of a contrivance on the market which answers to all of the requirements of being safe, practical, and efficient. I would certainly not favor them as stock equipment. A fender, to be practical, must necessarily have to ride close to the ground, and have some device for raising and lowering quickly and without much trouble on account of the many obstacles a truck meets in the course of a day's travels"

W. K. Chilcott, sales manager of the General Motor Truck Co., did not differ with the other officials of commercial vehicle manufacturing concerns, as the following extracts from his letters will testify:

"An ordinance similar to the Chicago ordinance was passed by the city of Detroit something like 18 months ago and they attempted to enforce same. We at that time had several trucks in cartage service in Detroit and naturally were forced to equip each of the trucks with some sort of a fender. After a great deal of trouble and red tape, the city officials got together and passed on two or three different makes which they would accept as complying with the ordinance. Of course, every user of motor trucks in the city of Detroit was required to invest anywhere from $15 to $25 for each truck in operation. The fenders were used something like 6 weeks or 2 months, when they were found impractical and of no use or benefit and at the present time none of the trucks now being operated in Detroit is equipped with fenders.

"We do not believe that fenders are necessary, neither do we believe they can be made practical, as to get a fender near enough to the ground, which will be an actual protection to pedestrians and, especially children, it will necessitate some sort of a raising device in order that the fenders can be raised when the truck leaves the pavement, as on country roads a great deal more clearance is required than in the city, and as practically all of the trucks are off of the pavement more or less of the time, the driver soon gets tired of manipulating the fenders and the consequence is it is left raised. After being left in this position any length of time, the continual dirt and water, to which the average motor truck is subjected, will soon rust the working parts and when the fender is necessary, in about 99 per cent of the cases it refuses to work.

"We do not believe that fenders should be made stock equipment. As politics are usually mixed up in matters of this kind, each city will adopt certain makes as standard. If each of the different cities were to force the use of fenders, it would require the truck manufacturer to carry an endless variety."

Walter White, vice-president of the White Co., is another truck maker who believes that Chicago is wasting time and energy in attempting to find a practical fender.

Time and Energy Wasted

"The matter will be an expense and annoyance to both the manufacturer and truck user and act more as a damper on truck business than an assistance," he writes. "At the same time, I do not believe it will be of any assistance at all to the Safety First movement, which is generally used as the argument for the fender.

"The only vehicle of any kind that is using fenders is the street car, and fenders are practical on street cars only because they run on a track and because that track is kept clear for them. You may have had the same experience as I have had with street cars of dodging a fender on the curb when it sticks out a little farther than expected, and if you can multiply that by the number of trucks there are in Chicago, that are being driven on all kinds of curves not only at corners but in the center of the street as well, you will begin to realize the added danger there is of putting a fender on a truck.

"You have also probably had the experience of seeing a street car bump into the rear of a wagon and bend up the fender and have them take it off and put it to one side until it is fixed. And, as I have before said, a street car runs on a track that is kept clear for it, and other traffic is kept out of the way of the street car, but that is not the case with the truck. If this ordinance is enforced, you can depend upon a large number of the fenders in the loop district being out of commission all the time.

"Detroit had an ordinance of this kind but has stopped using it, because there were more accidents with fenders than without them."

In the meantime, Chicago police officials are prosecuting their search for something that Detroit could not discover—a practical fender—and if they decide their quest is successful, 5,000 truck owners of Chicago will be forced to expend from $75,000 to $125,000 to equip their vehicles with the sanctioned appliance or pay the penalty of fracturing a municipal law.

Many Wrecked War Cars Rejuvenated by the Allies

British Maintain Big Repair Plant Back of Firing Line Where Motor Vehicles Are Put in Shape for Military Work

A row of damaged war cars awaiting the services of repairmen in the truck hospital of the English army

By W. F. Bradley

PARIS, Dec. 20—Four months' active service—120 days without seeing the inside of a garage, over roads which have varied from city boulevards to rocky highways; 120 days' hard driving, pursuing the enemy or being pursued by him, day and night work to the limits of human and mechanical endurance; 4 months under sunshine, rain, hail and snow, alternating with shot and shell—after such service it is to be expected that the army motor car repairman is busy and that the junk heap is piling up to respectable proportions.

Horse Fails; Motor Substituted

Nobody knows how many motor cars have been destroyed in this war. It would not serve any very useful end to have this information, for everybody is convinced of their usefulness, and that conviction would not be altered if it were officially announced that hundreds of cars had been destroyed. A large amount of the destruction is due to the failure of the horse. Under the fire of guns, horses have melted like a candle in a drafty alley.

When plans were drawn up in comfortable offices at home, and when those plans were tested at pleasant autumnal maneuvers, it was understood that motor trucks should travel from railhead to rendezvous, that at this point some 5 or 6 miles back of the firing line, the food and ammunition should be transferred to the horse transports for direct conveyance to the men at the front. The London bus driver who promptly responded to the call, "Your King and Your Country Need You," soon found that he was not going to lose any of the fun.

Some of the early fighting resulted in wholesale slaughter of cavalry horses. Indeed, it hardly was necessary to slaughter to produce a shortage. Almost any kind of a bullet wound is sufficient to put a horse out of business, and it is amazing what an easy target the horse offers to the enemy. With their horses melting away, the cavalry swooped down on the army service corps, took the animals most suited to their purpose, and when the ex-bus drivers and others reported at the rendezvous there was nobody there to greet them. Thus the trucks went right up to the firing line.

It was a situation which might have been foreseen if the organizers possessed less routine and a little more imagination. The lack of foresight, however, was a matter of small importance. Men and trucks forgot that the horse ever had been a factor; they carried ammunition right up to the batteries; they made night trips to the men in the trenches; they had skirmishes with the enemy's scouts; they were shelled sometimes, but they did their business and did it considerably better than it could have been done under the old system of transferring from motor truck to cart.

This new method of working is largely responsible for the great wreckage of motor trucks. It is impossible to go within range of the opponents guns without being hit from time to time, and it is certainly difficult to travel over roads which have been dug up by hoofs, wheels and shells without occasionally breaking springs and other sundries. Thus, after 4 months' war, the repair department is working at high pressure.

The British army has tackled this breakdown problem in a businesslike way. Wrecked trucks and touring cars are brought into the railhead, just back of the firing line; trainloads are made up, and they are sent to a big repair depot 100 miles and more to the west of the scene of operations. Every kind of vehicle, in every possible and impossible shape, is gathered up from the roadside and shipped to the rear. They are not merely English cars; captured and abandoned German vehicles are gathered up with the others and sent to the depot. They come in trainloads or in isolated trucks, day after day and night after night they roll in, silent testimony to the destructiveness of war. The trains are brought right into the repair depot, which is equipped with traveling cranes and all necessary material for rapid and convenient loading and unloading.

Wreckage of the Battlefield

The sight in this yard is unique. On the tracks is a train with wreckage from the front. In the yard is to be found row upon row of motor vehicles of every kind. Every British firm is represented in this yard. The history of some of the vehicles is known; around the majority one must weave romance, which certainly will not be half as strange as the truth.

At the beginning of a row of fifty were two German touring cars, a Benz and a Dixi. The Benz had been captured from the Germans; it had been used by British officers and finally abandoned by them when a shell blew away the radiator and the front axle. The Dixi had gone over a bank when the driver was shot by a British scout. For weeks the machine

lay rotting in the mud until the breakdown gang brought it in. But its useful life was not finished. Although it was covered with mud, although its metal work was red with rust, and although its fenders and running boards had been carried away, the instruction card read, "Complete overhaul; return to advanced base."

Unguarded Radiators Suffer

Next door were three London taxicabs, vehicles taken straight out of peaceful service and thrust into the thick of the battle. They were destined for the scrap heap. Further along was an English truck with a big hole in the waterjacket of the forward cylinder. A sharp frost had surprised the driver, who in his annoyance had put a hammer through the frost-bound jacket. Nearby were three examples of how radiators suffer in the war. Practically all the trucks sent into France from England at the outbreak of hostilities were without radiator guards, with the result that scores of trucks have been permanently crippled by their companions backing into them. A guard is not only essential, but it should be of such stout construction as to afford protection against violent shocks.

A few yards away was a wreckage in which the stoutest radiator guard would have been no protection. While going over a grade crossing at night a big army-type Leyland lorry, filled with ammunition, was struck by a train. It would only be a waste of time to attempt to describe it, but probably the most wonderful thing is how all the bits were collected and brought back to the depot, 150 miles from the scene of the accident. On a railroad truck, ready to be unloaded, was a six-cylinder Daimler, on the front wing of which a shell had exploded, killing the driver and the man by his side, and carrying away most of the front portion of the vehicle. Behind it was a yellow Mercedes with the German arms painted on the door panels. The car had been used by a general who was killed by a British shell. It had been impossible to get the car away and it was later captured by English soldiers.

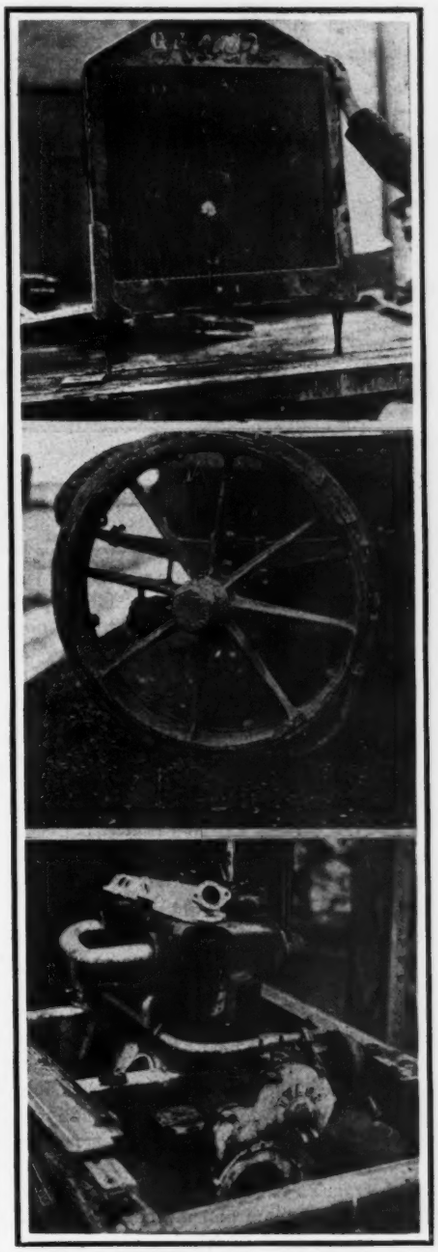
Immediately after being unloaded, the vehicles are examined with a view to determining what shall be done with them. Some are marked down as scrap, but it is very rarely that an entire unit has to be sacrificed. Out of what appears to be a mass of wreckage, it is generally possible to pick out a motor, a gearbox, a rear axle, a set of wheels, or some other component parts. Very frequently two wrecked vehicles can be united into one perfect car. This particularly applies to the captured German car, for which spare parts are difficult to obtain. With the English vehicles there is no such difficulty. Whatever parts are required can be obtained; but if the vehicle as a whole is not worth repairing, its component parts are picked out and sent to the store room.

In the big depot at which the vehicles are received there are workshops, but no machine tools. Thus the work undertaken is of a selective nature, together with such repairs as call for the simple change of units. A short distance away is a complete motor car factory taken over by the British army. It has been manned with English mechanics drawn from the various English motor car factories and having enlisted for the length of the war.

Mechanics Under Military Control

Although the men are working at their own trade, they are soldiers; the entire organization is military. A number of the original workmen attached to the factory have been retained for the machine tools, but although these men are not in uniform, they are under military control. It is in this factory that all the truck repairs are undertaken. Some touring cars are attended to, but so great is the demand on the staff that a very considerable proportion of this work is turned over to the French motor car factories in the neighborhood. Practically all the Daimler and Rolls-Royce cars are given to the French branches of these companies, for the work being special, can be handled more economically by these firms than by outsiders. At the Daimler factory alone, the average number of cars under repair is about fifty. Another of the factories undertaking this work usually has forty cars in hand.

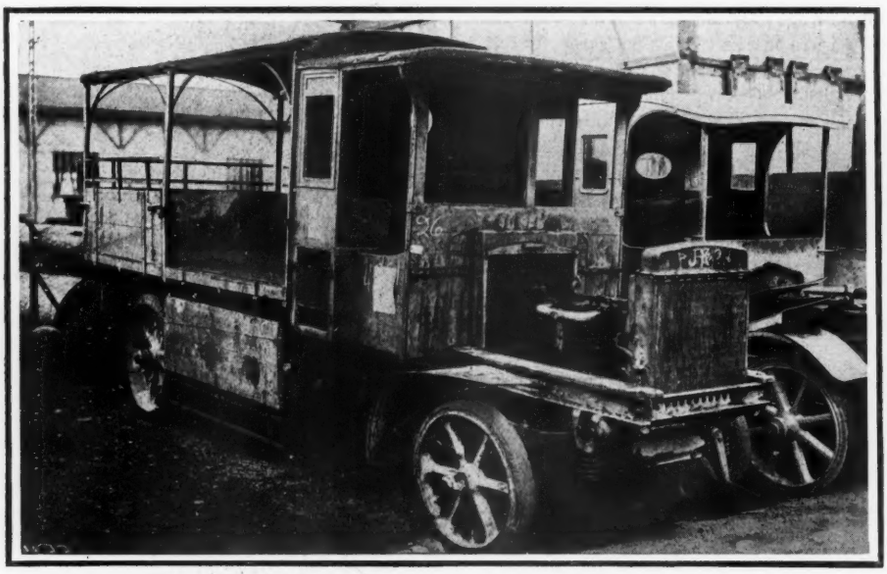
Some rather curious situations have arisen in connection with this work. The organization is under the control of army service corps officers and every man is a



Upper illustration—Radiator of a German truck which was used by English scouts as a target. Center illustration—A solid tire damaged in actual service with the allies' army. Lower illustration—Engine of truck sent to repair depot because driver failed to drain off water in radiator.

CONDEMNED CARS IN BRITISH REPAIR DEPOT

HOW TOURING CARS COME BACK FROM THE WAR



A GERMAN TRUCK CAPTURED BY BRITISH AFTER IT HAD CAUGHT ON FIRE

soldier. Probably 80 per cent of these men have enlisted for the length of the war, and have had no military training; they are not fighting men. Incorporated with them are men of the A. S. C. branch of the regular army; practically all the non-commissioned officers come in this class. As good pay has had to be offered to get the drivers and mechanics, it generally happens that the private is better off, financially, than his superior.

Repairmen Are Well Paid

Most of the mechanics are paid from $10.60 to $11 per week, food and lodging being provided, and in addition, are entitled to a separation allowance if married. The rate of pay would be very satisfactory at ordinary times, but being under military rule, the men have to work longer than they would do at home and really do not draw as much as the French mechanic who is free from military service and can claim from 22 to 29 cents an hour. Nevertheless, the drivers and mechanics are the most highly paid of all the men serving with the armies in the field.

When a truck is ordered to the repair depot, its two drivers accompany it. The men may either be kept at the depot, employed in various ways, until their vehicle is ready, or more frequently they are sent back on another truck. The parties returning to the front travel in convoys of about twenty trucks under the control of an officer in a touring car. In any case, the men never remain long at the rear. Unless they are in need of rest themselves, or have to get together a fresh kit, they are alloted a fresh vehicle and return to the scene of operations within a few days.

When impressed trucks were sent into France they carried all the advertising matter of their original owners. When they come into the depot they are painted gray, which color appears to be replacing the khaki tint adopted at the outset. Much greater attention now is paid to the protection of drivers. Every repaired vehicle is fitted with fore-doors and a high-curved dash, surmounted by a leather apron on both front and sides. The steering wheel is entirely under cover; only the driver's head appears, and as there is a substantial wood roof extension, the men are almost as well protected as in a closed car. Certainly the average touring car driver is not as well protected from the elements.

Before being sent away all repaired vehicles are tested in hilly country. Originally they were sent away as soon as they had passed the shop foreman's hands, but there were so many breakdowns 15 to 20 miles from home that it was found to be better policy to give each one an individual trial.

Four months' service has been sufficient to give the mechanical transport department a lot of valuable comparative data on army trucks. Despite the unsatisfactory conditions under which this war was begun—for notwithstanding German statements to the contrary, the British army was not prepared for a great continental war—the mechanical transport department has given remarkably efficient service. Certain types are more highly appreciated than others, but very few can be considered unsatisfactory.

Several Faults Are Noted

One firm has earned for itself a poor reputation by reason of broken steering knuckles; another has weak rear springs, while a third make would be perfect if more clearance were given to the rear axle. A very common complaint is the insufficient protection of radiators. Even when guards are fitted they are in many cases insufficient for their work. It has been shown that the most highly specialized commercial types are the least satisfactory for war.

The London omnibus chassis generally is recognized to be the finest of its kind in existence and most admirably suited for work on London streets. Under war conditions it is giving a considerable amount of trouble. Police regulations have caused weight to be cut to the danger line. Although this is not apparent on city streets, it is painfully evident at the seat of war. The motors, which have thermo-syphon cooling, persistently overheat when put to heavy work. The vehicles are incapable of hauling another of equal load and weight. Spring breakages are common. This is not a condemnation of the B type chassis; for its own particular work it is second to none; it is certainly superior to the Paris bus. But while the French vehicle is free from breakdowns, for it was designed with war service as a possibility, the English bus chassis is proving a weakling. It is merely a case of over-specialization.

Tires have been submitted to a particu-

HOW ENGLISH DRIVERS ARE PROTECTED FROM THE ELEMENTS

DE DION AMBULANCE STOPPED IN ARGONNE FOREST BY WATER CIRCULATION TROUBLES, DUE TO FROST

larly severe test. Vehicles, which went into service early in August, have come back during the first days of December with their rubber bandages worn down to the metal rims. The wear is not normal; in northern France and Belgium the roads are paved with granite sets, and on each side of the paved track is a dirt road almost as wide as the road itself. At times traffic at the railhead and on the road to the front is as dense as at the wharfs in New York at 11 a. m. Convoys frequently have to get off the crown of the road to allow others to pass. This alternative contact with the dirt surface and with the edge of the granite blocks causes a lateral frittering away of the rubber bandage.

Tire Troubles Are Many

These conditions probably explain why wheels with twin tires sometimes have the inner tire worn completely away, while the outer bandage is in comparatively good condition. Trouble also has been experienced with tires stretching and coming entirely off the rim. It is difficult to explain this otherwise than by a general loosening of the whole bandage when pulling out of a difficult position with wheels skidding violently. When the tires have gone it is generally necessary to send the truck back to the repair depot for a fresh set to be fitted. More often than not mechanical repairs have to be carried out at the same time. The work of fitting new tires is entrusted to the tire manufacturers. In certain cases, where fleets of one type are employed, spare wheels are sent out, but this is not very commonly done.

During the past few weeks the difficulties of army motor car drivers have been increased by reason of the weather. To prevent the cooling water freezing denatured alcohol has been served out to the mechanical transports. Where this antifreezer has not been available, the men have had to empty radiators and jackets. The attempt to do this has revealed the fact that on some types it is almost impossible to drain off all of the water. Before letting the water run to waste the precaution has to be taken to see that a supply of running water will be available the next morning.

Water is not the only source of trouble. During cold nights oil congeals to such an extent that it is impossible to spin the motors. A little kerosene will soon slacken off a gummed-up motor, but unfortunately kerosene generally is an unknown article at the front.

WINTON IN WIRE WHEEL SUIT

Cleveland, O., Jan. 9—Action charging infringement of his patent on wire-spoked wheels was brought in the United States district court, Cleveland, Tuesday, by John Vernon Pugh, of Allesley, England, against the Winton Motor Car Co.

Pugh, who is represented by Augustus B. Stoughton, an attorney of Philadelphia, asserts title to patent No. 1,047,702, issued December 17, 1912, an improvement in wire-spoked wheels for motor cars. He charges that wheels made by the Houk Mfg. Co., of Buffalo, which he calls an infringement on his patent, are used in the equipment of Winton motor cars and asks an injunction against the Winton company and damages.

ADAMS BROS. RECEIVER DISCHARGED

Findlay, O., Jan. 11—W. D. McCaughey has been discharged as receiver of the Adams Bros. Co., builder of Adams truck. A reorganization scheme has been completed. Old stockholders have surrendered all their stock and in return received 25 per cent back in the reissue, the balance of $140,000 being sold to other parties. The capital stock of the company is now $300,000 at $100 per share.

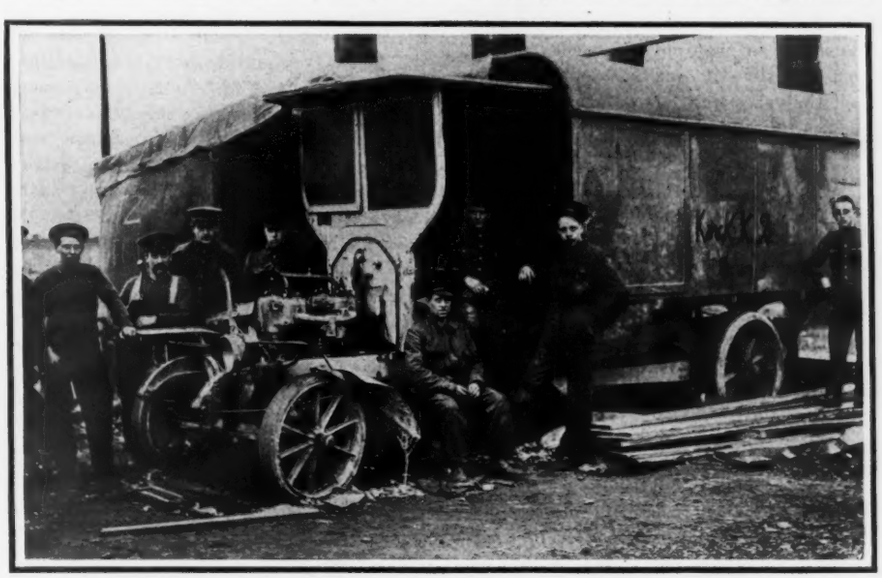
GOODYEAR TAKES OVER MOTZ SALES

Akron, O., Jan. 9—The Goodyear Tire and Rubber Co. has taken over the sale of the products of the Motz Tire and Rubber Co., cushion tires made for passenger electrics and gasoline and electric commercial cars.

The transfer of sales will formally take place February 1. On and after that date, Goodyear will make all sales and adjustments. In the meantime special representatives of the Motz company will call at all Goodyear branches, to make sure that all details are handled without confusion and that the trade is taken care of.

By the new arrangement it is promised that users of Motz tires will receive much better service than ever before, because of the facilities provided by Goodyear branches in all the principal cities of the country. Hitherto Motz tires have been handled by distributors in various cities.

For the present, the sale of Motz tires will be handled as a part of the work of the Goodyear motor truck tire department.



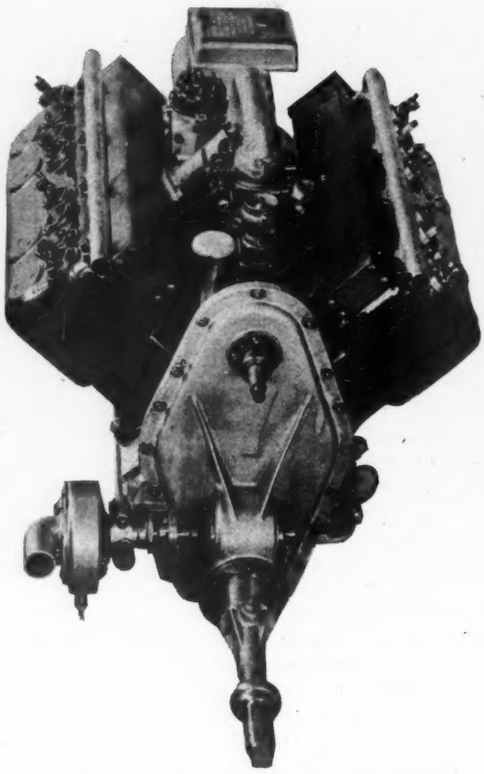
A GERMAN TRUCK BEING REPAIRED BY ENGLISH SOLDIER MECHANICS

Herschell-Spillman, the Latest Eight-Cylinder Motor

V-Type With Cylinder Blocks Set Staggered

THE latest eight-cylinder motor to be announced is that recently developed by the Herschell-Spillman Co., North Tonowanda, N. Y., which, while not exhibited at New York, has been completed by the factory and is now undergoing its bench test. This latest eight is a conventional V-type, with two-block cylinders mounted at 90 degrees, and having intake and exhaust valves on the one side, so that a single cam shaft within the crankcase serves for both sets of valves. The motor has cylinder 3 by 5, giving an S. A. E. rating of 28.4 horsepower, but which has shown 48 horsepower at 1,000 r. p. m. under test.

The Herschell-Spillman eight differs from the eights already announced in several features of design, the most important being that the yoke and connecting rod is not used, but the connecting rods for opposite cylinders are standard I-beam types, which fit side by side on the crank pin, two connecting rods attaching in this relation on each crank pin. This feature of design means that the four cylinders constituting one block are not directly opposite to the four forming the other block, but are staggered slightly, so that the cylinder blocks on the left is 1 5/16 inch forward of the block on the right. This arrangement makes the overall length of the motor practically the same amount longer, but permits of mounting the connecting rods side by side, as stated, and also allows of using a camshaft with sixteen cams, instead of eight cams on the opposite type. Using separate cams allows of any variation in timing.



Latest eight-cylinder motor to be announced—the Herschell-Spillman. The rods of this motor have no yoked ends, but are set side-by-side on the crankpin. Another difference from other eights is that the cylinder blocks are not directly opposite but are set staggered.

Motor Developed Quickly

The Herschell-Spillman company has established a record in the development of this motor in that but 4½ weeks elapsed from the time it was laid out on paper until the completed job was on the testing block. Building eights is not entirely new with this company in that 6 years ago it built its first eight-cylinder V-type motor with 7¼ by 7-inch cylinders for racing motor-boat use.

In its eight for motor cars the overall length is 34 5/16 inches and the overall width 27 inches. The motor is made to take a gearbox as a unit and has the standard S.A.E. bell housing 16⅛ inch diameter to which the gearbox bolts. It is designed for three-point support. Two rigid crankcase arms in the flywheel plane and a trunnion support at the forward end. No effort has been made to reduce weight, but as compared with a six-cylinder of the same piston displacement it weighs approximately 213 pounds less. With complete aluminum crankcase the weight is 550 pounds, and with cast-iron crankcase, 660 pounds.

The general layout of the motor does not deviate far from the conventional. In the V between the cylinder blocks, the carbureter is located in front and mounted sufficiently high to leave the valves accessible. At the rear is the battery coil ignition system, the illustration showing the Delco equipment combining ignition starting and lighting. In front is a short transverse shaft carrying the double water pump on the left, but when separate systems are used the generator can be driven from the opposite end of this cross shaft and the starter-motor located under the left cylinder block and bolted to the crankcase, where it drives by pinion to the steel gear ring bolted to the flywheel. In such a case the starter-pinion can be controlled manually, electro-magnetically, or by the Bendix drive. The camshaft lies in the top of the crankcase directly above the crankshaft and is driven therefrom by spiral gears.

Directly above the camshaft is the shaft driving the ignition system, also driven by spiral spur gear.

The crankshaft is a three-bearing type. Pistons carry three rings well above the wrist pin, the top ring a leak-proof type and the other two eccentric rings with spliced joint.

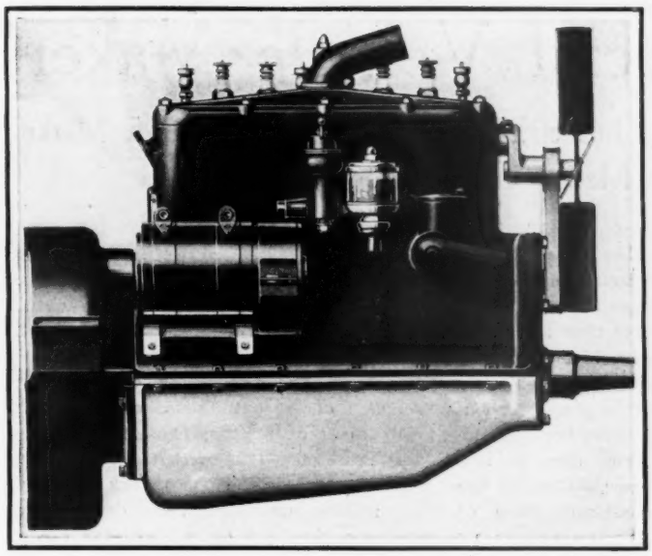
Particular attention has been given to water circulation, which is maintained by double centrifugal pump, containing a double runner, which literally means a double pump, one portion maintaining circulation in one cylinder block and the other in the opposite block. The pump has two discharges and separate pipes connect with each cylinder block. The return water circuit is taken at four points out of each cylinder block, these openings being opposite each exhaust valve, and the size of these openings has been determined experimentally with the thought of maintaining constant temperature at all four openings in order to keep the temperature the same at all four exhaust valves. In the cylinder casting each cylinder bore is entirely surrounded by water, there being ½-inch jacket space between the first and second and third and fourth cylinder bores. Intake and exhaust valve seatings are entirely surrounded by water and the jackets extend to a point ½ inch below the top of the piston when at the bottom of its stroke.

The oiling is by pressure, without splash in the crankcase and with the oil pressure regulated between a minimum of 10 and a maximum of 40 pounds. The gear pump is located in the crankcase well on the bottom of a vertical shaft, which takes its drive through 45 degree spirals from the camshaft. Oil is delivered through a longitudinal hole in the crankcase, extending from front to rear and thence by three branches to the three bearings of the crankshaft and camshaft. The crankshaft is drilled with ¼-inch opening and the oil delivered by centrifugal force to the lower connecting rod bearings and thence through a steel tube attached to the connecting rod, it reaches the wrist pin bushing through a hole on the top, the oil being thus fed on the slack side of the wrist pin journal. A blow-off valve allows of the discharge of oil to the timing gears at front, which are submerged well above the cross shaft, the overflow from these finding its way back into the crankcase. At 1,000 r.p.m. the oil pressure is 18 pounds, and at 2,600 r.p.m., it is reported to be 40 pounds.

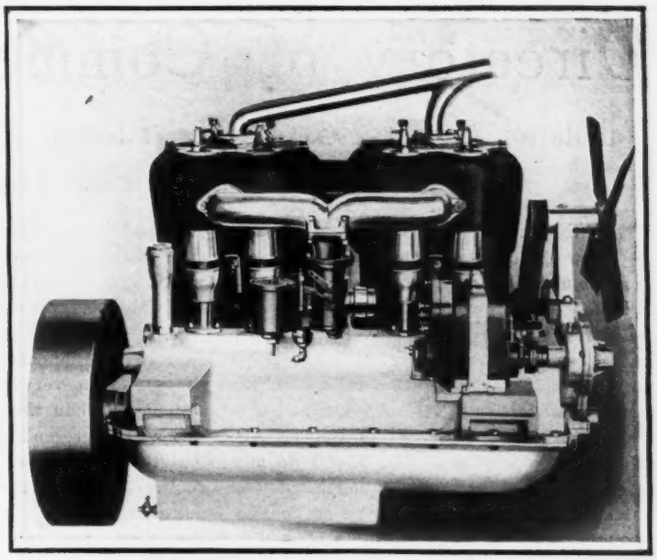
Timing of the Motor

Timing is practically the same as in other eights. The order of firing in the right-hand group is 1, 3, 4, 2.

Valve actuation is one of the delicate matters in an eight. In other words, extreme accuracy must be kept in mind in the valve mechanism starting with the single camshaft and reaching the valves.



Inlet side of the new four-cylinder Wisconsin motor model QU. It has a bore and stroke of 3¼ by 5 and the cylinders and upper portion of the crankcase are cast as a unit. A removable cylinder head is employed and the carbureter feeds through a cored passage in the casting



Inlet side of the model J, another new Wisconsin motor, this one being designed for commercial car use. It has a bore and stroke of 5 1/10 by 5½, and as shown above had separate valve inclosures. It is designed so that a governor may be fitted

Two New Wisconsin Company Motors Are Announced

One an L-Head Block for Passenger Cars; Other for Trucks

THE Wisconsin Motor Mfg. Co., Milwaukee, Wis., has augmented its line of motors with two new types, both of four cylinders, one a block-cast, L-head 3¼ by 5 for passenger cars and the other a pair-cast, T-head, 5 1/10 by 5½ for commercial vehicles. The latter follows former Wisconsin practice as regards cylinder type, manifolding, etc., but shows a number of improvements in detail and also in the metals employed. The L-head design is quite uncommon to previous Wisconsin construction and is built with a flywheel cover so providing for attachment of a unit clutch and gearset.

In the L-head passenger car motor called mode Q U, the Wisconsin company has well applied three desirable features—removable cylinder head, integral cylinder and upper crankcase and mixture feeding through a cored passage. The whole motor is an exceptionally clean piece of work with the carbureter on one side set unusually high and the magneto on the other. The exhaust manifold and valves also are on the magneto side, the valve mechanism being covered with one large plate fastened by two large hand screws.

Internally the new Wisconsin employs a two-bearing crankshaft of 2 inches diameter, a single camshaft with integral cams operated by helically cut gears made of steel and operating against semi-steel ones.

Cooling is by thermo-syphon and oiling by circulating splash. The oil is circulated by means of a plunger pump, accessibly located on the side of the motor, and driven by the cam shaft. This pump takes the oil from the pump through a strainer, and forces it through a duct to troughs under the connecting rods. The oil is picked up by the rods and enters the connecting rod bearings through openings in the lower caps. The rods also throw the oil into a pocket over the main bearings and cam shaft. The spray formed lubricates the cylinders. The crankshaft gear is provided with a recess in the rear face into which oil is fed from the front main bearing. From this recess the oil is directed by centrifugal force through drilled holes directly into the gear teeth.

The commercial-car motor, known as the model J, was designed especially for fire-department work. Its four cylinders are of T-head construction, cast in pairs with the valves on either side inclosed in individual housings which may be removed easily for valve adjustment. This motor uses a crankcase made entirely of aluminum alloy, pump cooling and forced lubrication through a drilled crankshaft.

APPLE STARTS PATENT SUIT

New York, Jan. 12—Vincent G. Apple, president of the Apple Electric Co., Newark, N. J., has started suit against a New Jersey dealer in handling cars which are being sold with the Delco starting and lighting system, the suit being for infringement of patent No. 1,079,090, issued to Mr. Apple November 18, 1913. It is claimed that the Delco system infringes this patent which refers to a machine for generating electricity as well as cranking a gasoline motor, the two functions being combined in the one unit.

The patent alleged to have been infringed refers to the methods of driving the main shaft of the machine which is driven at one end from the gasoline engine as a generator but must be provided with means at the opposite end for cranking the motor. The patent is claimed to embrace automatic means between the generator-starter shaft and the gasoline engine shaft which provide for disconnecting at this end when the cranking motor is starting the engine; and to incorporate means at the flywheel end for manually engaging a pinion with the toothed flywheel rim.

The connection at the forward end of the shaft also is claimed to incorporate means whereby after the generator-starter is disconnected in starting and the gasoline motor speeds up the automatic means will engage and drive the generator-starter for battery charging purposes.

NEW WILLARD SERVICE STATION

Chicago, Jan. 12—The Willard Storage Battery Co., Cleveland, has opened its new service station here at 2534 Wabash avenue. In this new station, which supplants the smaller one previously used, the work consists of charging all makes of batteries, repairing Willard batteries of all types and building electric vehicle batteries to order.

The service building is a one-story affair with a floor space of about 11,000 square feet. This is divided into four departments, the offices, the battery repair shop, the stock room and the charging room. In all more than thirty men are employed to take care of the business. Five men do nothing but charge batteries, the department having facilities for taking care of 900 cells at one time.

Directory of Commercial Vehicle Makers

Tabulation Giving 253 Gasoline, Electric and Industrial-Electric Trucks on 1915 Market, With Names and Addresses of Their Makers and Catalog of Capacities

ON this and the two following pages Motor Age lists the names of the American manufacturers of commercial vehicles, including gasoline, electric and industrial-electric or indoor vehicles such as are used by railroads and large shippers. Besides showing the car name, its maker and his address, the narrow columns at the right designate the models the maker is building. The figures do not refer to the number of the models shown, but simply mean that that type of vehicle is manufactured. For example, the Admiral company markets 1½-ton models only, while the Avery lists, 1, 2, 3 and 5-ton models. The number cars of each model can be obtained from the specification tables shown on pages 38 to 49.

It is interesting to note that the manufacture of commercial vehicles has increased at a very rapid rate, greater in proportion than that of the passenger car, and at the present time there are approximately 100,000 commercial cars in this country. During the year just ended the greatest number of cars sold were of less than 1-ton capacity and runner up was the 1 to 2-ton cars. The former class showed 37.5 per cent and the latter 32.5 according to the statistics of Alfred Reeves, general manager of the Automobile Chamber of Commerce. The output of motor trucks during 1914 showed 13 per cent for trucks of more than 2 and less than 3-tons capacity while only 4 per cent of the output was of commercial vehicles of over 5-tons capacity.

It is obvious that with the war in Europe making demands for trucks of American makers, and with home demands increasing, the 1915 output will far exceed that of the year just past.

NAME	MANUFACTURER	ADDRESS	MODELS IN TONS CAPACITY (Figures do not refer to number of models)														
			Under ½	½	¾	1	1½	2	2½	3	3½	4	4½	5	5½	6	6½	7 and over
A. & B	American & British Mfg. Co	Providence, R. I								3				5				
A. & R	Abendroth & Root Mfg. Co	Newburgh, N. Y								3		4		5				
Adams	Adams Bros. Co	Findlay, O				1	1½	2										
Admiral	Admiral Motor Car Co.	St. Louis, Mich					1½											
Aetna	Aetna Motor Truck Co	Detroit, Mich					1½		2½									
American	American Motor Truck Co	Detroit, Mich				1												
American-Argo*	American Electric Car Co	Saginaw, Mich		½		1												
Armleder	O. Armleder Co	Cincinnati, O				1	1½	2										
Atlantic*	Atlantic Vehicle Co	Newark, N. J		½		1		2			3½			5				
Atterbury	Atterbury Motor Car Co	Buffalo, N. Y			¾	1		2		3				5				
Auglaize	Auglaize Motor Car Co	New Bremen, O			¾													
Autocar	Autocar Co	Ardmore, Pa					1½											
Automatic**	Automatic Transportation Co	Buffalo, N. Y				1		2										
Available	Available Truck Co	Chicago, Ill				1		2										
Avery	Avery Co	Peoria, Ill				1		2		3				5				
B. A. Gramm	Gramm-Bernstein Co	Lima, O				1		2			3½			5				
Baker*	Baker Motor Vehicle Co	Cleveland, O		½		1		2			3½			5				
Barker	C. L. Barker	Norwalk, Conn				1		2										
Bauer	Bauer Machine Works Co	Kansas City, Mo		½	¾													
Beardsley*	Beardsley Electric Co	Los Angeles, Cal		½		1												
Beaver*	Beaver State Motor Co	Portland, Ore																
Beck	Beck & Son	Cedar Rapids, Ia					1½		2½									
Bessemer	Bessemer Motor Truck Co.	Grove City, Pa				1	1½	2										
Best	Durant-Dort Carriage Co	Flint, Mich		⅜														
Bingham	Bingham Mfg. Co	West Park, O			¾													
Blair	Blair Motor Truck Co	Newark, O						2		3		4		5				
Board	B. F. Board Motor Truck Co	Alexandria, Va																
Brasie	Brasie Motor Truck Co	Minneapolis, Minn	¼					2										
Brennan	Brennan Mfg. Co	Syracuse, N. Y																
Brockway	Brockway Motor Wagon Co	Cortland, N. Y			¾		1½	2										
Bucklen	H. E. Bucklen, Jr., Motor Truck Co	Elkhart, Ind			¾		1½		2½									
Buckwalter**	Elwell-Parker Electric Co	Cleveland, O																
Buffalo	Buffalo Auto-Truck & Motor Co	Buffalo, N. Y																
Buffalo*	Buffalo Electric Vehicle Co	Buffalo, N. Y				1												
Buick	Buick Motor Co	Flint, Mich			¾													
Bulley Tractor	Mercury Mfg. Co	Chicago, Ill																T.
Caldwell	Empire Axle Co	Dunkirk, N. Y																
Capitol*	Capitol Truck Mfg. Co.	Denver, Colo																
Carl*	Carl Electric Vehicle Co	Toledo, O																
Carlton	Carlton-Hill Motor Car Co	Rutherford, N. J																
Carroll	Carroll Motor Car Co	Strasburg, Pa																
Casey	F. A. Casey Co	Billerica, Mass		½														
Chase	Chase Motor Truck Co	Syracuse, N. Y			¾		1½			3								
Coleman	Coleman Carriage & Hardware Co	Ilion, N. Y				1		2		3								
Commerce	Commerce Motor Truck Co	Detroit, Mich			¾													
Connersville*	Connersville Buggy Co	Connersville, Ind																
Continental	Continental Truck Mfg. Co	Superior, Wis					1½			3								
Corbitt	Corbitt Auto Co	Henderson, N. C					1½											
Couple-Gear	Couple-Gear Freight Wheel Co	Grand Rapids, Mich									3½			5				
Couple-Gear*	Couple-Gear Freight Wheel Co	Grand Rapids, Mich									3½			5				
Cowan Transveyor**	Cowan Truck Co	Holyoke, Mass						2										
Crawford	Crawford Automobile Co	Hagerstown, Md								3								
Crescent	Crescent Motor Truck Co	Middletown, O								3				5				
Croce	Croce Auto Co	Asbury Park, N. J			¾			2										
Crown	Crown Commercial Car Co	North Milwaukee, Wis			¾		1½		2½									
C. T	Commercial Truck Co. of America	Philadelphia, Pa												5				
C. T.*	Commercial Truck Co. of America	Philadelphia, Pa		½		1		2			3½			5				
Curtis	Pittsburgh Machine Tool Co	Braddock, Pa						2		3								
Daimler, American	General Vehicle Co	Long Island City, N. Y														6		
Dain	Dain Mfg. Co	Ottumwa, Ia				1												
Dart	Dart Motor Truck Co	Waterloo, Ia			½	1		2										
Dayton	Durable Dayton Truck Co	Dayton, O				1						4						
Dayton*	Dayton Electric Car Co	Dayton, O																
Decatur	Parcel Post Equipment Co	Grand Rapids, Mich	⅝			1												
DeKalb	DeKalb Wagon Works	DeKalb, Ill					1½		2½									

*Electric. **Electric industrial (indoor). †Steam.

253 Trucks, Their Makers and Capacities for 1915

NAME	MANUFACTURER	ADDRESS	MODELS IN TONS CAPACITY (Figures do not refer to number of models)															
			Under ½	½		1	1½	2	2½	3	3½	4	4½	5	5½	6	6½	7 and over
Denby	Denby Motor Truck Co	Detroit, Mich			¾	1												
Detroit*	Anderson Electric Car Co	Detroit, Mich.						2										
Diamond-T	Diamond-T Motor Car Co.	Chicago, Ill.			¾		1½			3								
Dispatch	Dispatch Motor Car Co	Minneapolis, Minn.		⅜														
Doane	Doane Motor Truck Co	San Francisco, Cal														6		
Dorris	Dorris Motor Car Co.	St. Louis, Mo			¾			2										
Duffy	Duffy Bros. Motor Truck Co.	San Francisco, Cal																
Dunlap*	Dunlap Electric Co.	Columbus, O		½														
Duplex	Duplex Power Car Co	Charlotte, Mich.						2		3								
Durocar	Amalgamated Motors Corp.	Alhambra, Cal.		½														
Duryea	Duryea Laboratories	Philadelphia, Pa.		½														
Dynamic**	Cleveland-Galion Motor Truck Co.	Galion, O																
Eastern	Eastern Power Truck Co.	Providence, R. I.																
Edison*	Edison Electric Vehicle Co	Lawrence, Mass.																
Electromobile**	Electromobile Co	St. Louis, Mo				1	1½											
Elwell-Parker**	Ellwell-Parker Electric Co.	Cleveland, O						2										
Erie	Erie Motor Truck Mfg. Co.	Erie, Pa																
Evans	Evans Motor Car & Parts Mfg. Co.	Traverse City, Mich.																
Fargo	Fargo Motor Car Co.	Chicago, Ill.			¾	1												
Fawick	Fawick Motor Car Co.	Sioux Falls, S. D.		½	¾	1		2										
Federal	Federal Motor Truck Co	Detroit, Mich.					1½											
Field*	Field Omnibus Co.	New York City																
Flint	Durant-Dort Carriage Co.	Flint, Mich.				1												
Forschler	Phillip Forschler Wagon Co	New Orleans, La.					1½											
Four Wheel Drive	Four Wheel Drive Auto Co.	Clintonville, Wis.						2		3						6		
Franklin	Franklin Commercial Truck Co	Franklin, Pa																
Fremont-Mais	Lauth-Juergens Motor Car Co.	Fremont, O						2										
Fritchle*	Fritchle Automobile & Battery Co	Denver, Col																
Fuller	Fuller Power Truck Co	Delphos, O																
Gabriel	Gabriel Auto Co	Cleveland, O		½	¾		1½											
Garford	Willys-Overland Co	Toledo, O						2		3		4		5		6		
G. A. Schacht	G. A. Schacht Motor Truck Co.	Cincinnati, O						2		3								
Gay	S. G. Gay Co.	Ottawa, Ill.			¾	1												
Geneva	Geneva Wagon Co	Geneva, N. Y.			¾													
GMC	General Motors Truck Co	Pontiac, Mich			¾		1½	2			3½			5				
GMC*	General Motors Truck Co	Pontiac, Mich		½		1	1½	2		3		4		5		6		
Golden West	Golden West Motors Co.	Sacramento, Cal																
Gramm	Gramm Motor Truck Co	Walkerville, Ont.					1½	2			3½			5				
Great Eagle	United States Carriage Co.	Columbus, O																
Great Southern	Great Southern Auto Co	Birmingham, Ala																
G. V.*	General Vehicle Co	Long Island, City N. Y.		½		1		2			3½			5				
G. V.**	General Vehicle Co.	Long Island City, N. Y.						2										
Hahn	Hahn Motor Truck Co	Hamburg, Pa.																
Handy Wagon	Auburn Motor Chassis Co	Auburn, Ind.	½	⅜	⅜													
Harrison	Robert Harrison Co	South Boston, Mass																
Harvey	Harvey Motor Truck Works.	Harvey, Ill.					1½			3								
Hercules	Hercules Motor Truck Co	South Boston, Mass																
Hoagland-Thayer**	Hoagland-Thayer, Inc.	Newark, N. J.						2						5T				
Homer	Homer Motors Co.	Los Angeles, Cal.		½														
Horner	Detroit-Wyandotte Motor Co.	Wyandotte, Mich				1	1½	2		3				5				
Hunt**	C. W. Hunt Co	West New Brighton, N. Y.						2										
Hupmobile	Hupp Motor Car Co.	Detroit, Mich	⅜															
Hurlburt	Hurlburt Motor Truck Co.	New York City				1		2			3½							
Ideal	Ideal Auto Co	Fort Wayne, Ind.				1	1½		2½									
IHC	International Harvester Corp.	Akron, O		½														
Independent	Independent Motors Corp.	Port Huron, Mich.			¾		1½											
Indiana	Harwood-Barley Co	Marion, Ind.					1½			3				5				
Imp	W. H. McIntyre Co	Auburn, Ind.	½															
Jeffery	Thomas B. Jeffery Co	Kenosha, Wis			¾		1½	2										
Juno	Juno Motor Truck Co.	Juneau, Wis.																
Kalamazoo	Kalamazoo Motor Truck Co.	Kalamazoo, Mich					1½											
Kanawha	Kanawha Auto Truck Co	Charleston, W. Va																
Kearns	Kearns Motor Car Co.	Beavertown, Pa.		⅜														
Kelly	Kelly-Springfield Motor Truck Co.	Springfield, O				1		2			3½			5				
King	A. R. King Mfg. Co	Kingston, N. Y.									3½							
Kisselkar	Kissel Motor Car Co.	Hartford, Wis			¾	1	1½		2½		3½					6		
Kleiber	Kleiber Co., Inc.	San Francisco, Cal					1½		2½		3½			5				
Knox Tractor	Knox Motors Co.	Springfield, Mass.														6T		10T
Koehler	H. J. Koehler S. G. Co.	Newark, N. J.				1												
Kopp	Kopp Motor Truck Co.	Buffalo, N. Y.					1½			3				5				
Kosmath	Kosmath Co.	Detroit, Mich.		½														
Krebs	Krebs Commercial Car Co.	Clyde, O.				1		2										
LaFrance	American LaFrance Fire Engine Co	Elmira, N. Y.												5				
Lambert	Buckeye Mfg. Co.	Anderson, Ind.	⅜		¾	1	1½	2										
Lange	Lange Motor Truck Co	Pittsburgh, Pa.					1½		2½									
Lansden*	Lansden Co., Ltd	Brooklyn, N. Y.																
Lauth-Juergens	Lauth-Juergens Motor Car Co	Fremont, O				1		2		3				5				
Lewis	Lewis Motor Truck Co.	San Francisco, Cal							2½	3				5				
Lippard-Stewart	Lippard-Stewart Motor Car Co.	Buffalo, N. Y.			¾	1	1½	2										
Little Giant	Chicago Pneumatic Tool Co	Chicago, Ill.				1												
Locomobile	Locomobile Co. of America.	Bridgeport, Conn								3		4		5		6		
Lord Baltimore	Lord Baltimore Motor Car Co	Baltimore, Md				1		2										
Maccar	Maccar Co	Scranton, Pa				1	1½	2										
Mack	International Motor Co	New York City				1								5		6		
M. & E.	Merchant & Evans.	Philadelphia, Pa.									3½			5				
Mais	Mais Motor Truck Co.	Indianapolis, Ind					1½	2	2½	3								8T
Mansur	Mansur Motor Truck Co	Haverhill, Mass.																
Marmon	Nordyke & Marmon.	Indianapolis, Ind			¾													
Martin	Martin Carriage Works	York, Pa.				1	1½		2½		3½							
McIntyre	W. H. McIntyre Co	Auburn, Ind			¾		1½			3								
Menominee	D. F. Poyer & Co.	Menominee, Mich			¾	1	1½											
Mercury	Mercury Mfg. Co.	Chicago, Ill.		½														T.
Mercury Pullem Tractor**	Mercury Mfg. Co	Chicago, Ill.																

*Electric. **Electric industrial (indoor). †Steam.

253 Trucks, Their Makers and Capacities for 1915

NAME	MANUFACTURER	ADDRESS	MODELS IN TONS CAPACITY (Figures do not refer to number of models)														
			Under ½	½	¾	1	1½	2	2½	3	3½	4	4½	5	5½	6	6½	7 and over
Milburn*	Milburn Wagon Co.	Toledo, O																
Modern	Bowling Green Motor Truck Co.	Bowling Green, O.				1	1½											
Mogul	Mogul Motor Truck Co.	St. Louis, Mo.						2				4				6		
Monitor	Monitor Automobile Works	Janesville, Wis.		½		1												
Moon	Joseph W. Moon Buggy Co.	St. Louis, Mo.					1½											
Moore	Pacific Metal Products Co.	Torrance, Cal.					1½	2		3		4		5				
Moore	Moore Motor Truck Co.	Philadelphia, Pa.																
Moreland	Moreland Motor Truck Co.	Los Angeles, Cal.			¾		1½		2½		3½			5			6½	
Morton	Morton Truck & Tractor Co., Inc	Harrisburg, Pa					1½	2	2½	3	3½			5		6		10T
Motokart	Motokart Co.	Scranton, Pa	¼															
Natco	National Motor Truck Co	Bay City, Mich				1												
Nelson & LeMoon	Nelson & LeMoon	Chicago, Ill.				1	1½	2										
Netco	New England Truck Co	Fitchburg, Mass					1½											
Nevada	Nevada Mfg. Co	Nevada, Ia.								3								
New York	Tegetmeier & Riepe Co	New York City					1½											
O. K	O. K. Motor Truck Co.	Detroit, Mich.					1½											
Old Hickory	Kentucky Wagon Mfg. Co.	Louisville, Ky.					1½											
Old Hickory*	Kentucky Wagon Mfg. Co.	Louisville, Ky.				1												
Old Reliable	Old Reliable Motor Truck Co.	Chicago, Ill.					1½	2		3		4		5				7
Overland	Willys-Overland Co	Toledo, O	⅜															
Owosso	Owosso Motor Car Co.	Owosso, Mich.																
Packard	Packard Motor Car Co.	Detroit, Mich.						2		3		4		5		6		
Palmer	Palmer-Meyer Motor Car Co.	St. Louis, Mo.				1	1½											
Palmer-Moore	Palmer-Moore Co	Syracuse, N. Y				1												
Paulding	St. Louis Motor Truck Co	St. Louis, Mo	⅜		¾	1		2										
Peerless	Peerless Motor Car Co	Cleveland, O								3		4		5		6		
Perfex	Perfex Co.	Los Angeles, Cal.		½														
Phoenix	Phoenix Auto Works	Phoenixville, Pa																
Pierce-Arrow	Pierce-Arrow Motor Car Co.	Buffalo, N. Y.						2						5				
Plymouty	Plymouth Motor Truck Co	Plymouth, O				1		2										
Power	Power Vehicle Co	Milwaukee, Wis																
Purity*	Purity Bread Co.	St. Paul, Minn.																
Reedsburg	Reedsburg Motor Truck Co.	Reedsburg, Wis.																
Reo	Reo Motor Truck Co	Lansing, Mich						2										
Republic	Republic Motor Truck Co.	Alma, Mich			¾	1	1½											
Rockford	Rockford Motor Truck Co.	Rockford, Ill																
Roland	Roland Gas Electric Vehicle Corp.	New York City				1				3	3½							
Rowe	Rowe Motor Co.	Downington, Pa					1½	2		3				5				
Royal	Royal Motor Truck Co.	New York City									3½			5				
Safety-First	Safety-First Motor Car & Truck Co.	Kalamazoo, Mich																
Sandow	Sandow Truck Co.	Chicago, Ill.					1½	2		3								
Sanford	Sanford Motor Truck Co.	Syracuse, N. Y			¾		1½	2										
Saxon	Saxon Motor Co	Detroit, Mich.	⅜															
Schleicher	Schleicher Motor Vehicle Co.	New York City						2		3				5				
Selden	Selden Motor Car Co	Rochester, N. Y					1½											
Service	Service Motor Truck Co.	Wabash, Ind				1	1½	2		3				5				
Siebert	Siebert Motor Truck Co.	Toledo, O			¾													
Signal	Signal Motor Truck Co.	Detroit, Mich.				1												
Smith-Milwaukee	A. O. Smith Co.	Milwaukee, Wis.									3½					6		
South Bend	South Bend Motor Car Works	South Bend, Ind.						2				4						
Speedwell	Speedwell Motor Car Co.	Dayton, O						2				4				6		
Standard of Detroit	Standard Motor Truck Co.	Detroit, Mich.								3								7
Standard of Ohio	Standard Motor Truck Co.	Warren, O			¾	1	1½	2			3½							
Stanley†	Stanley Motor Carriage Co	Newton, Mass			¾		1½											
Stegeman	Stegeman Motor Car Co.	Milwaukee, Wis.			¾		1½		2½		3½			5				
Sternberg	Sternberg Motor Truck Co	Milwaukee, Wis.		½				2		3				5		6		7
Stewart	Stewart Iron Works.	Covington, Ky.				1												
Stewart	Stewart-Motor Corp.	Buffalo, N. Y.			¾													
Storms*	Storms Electric Car Co	Detroit, Mich.	¼															
Studebaker	Studebaker Corp.	Detroit, Mich.			¾													
Sullivan	Sullivan Motor Car Co.	Rochester, N. Y					1½											
Tiffin	Tiffin Wagon Co	Tiffin, O			¾	1		2										
Toeppner	Toeppner Bros.	Bay City, Mich																
Toledo	Toledo Motor Truck Co.	Toledo, O																
Traboid	Traboid Motor Mfg. Co	Johnstown, Pa.				1		2		3								
Transit	Transit Motor Car Co	Louisville, Ky.				1		2			3½			5				
Trumbull	Trumbull Motor Car Co.	Bridgeport, Conn	¼															
Tulsa	Tulsa Automobile & Mfg. Co	Tulsa, Okla			¾	1	1½											
Tuttle	Tuttle Motor Co	Canastota, N. Y																
United States	United States Motor Truck Co.	Covington, Ky.						2	2½	3		4						
Universal	Universal Motor Truck Co	Detroit, Mich.					1½			3								
Urban*	Kentucky Wagon Mfg. Co.	Louisville, Ky.			¾		1½		2½			4						
Van Winkle	Van Winkle Motor Truck Co	Atlanta, Ga																
Velie	Velie Motor Vehicle Co	Moline, Ill.				1	1½		2½			4		5				
Vim	Touraine Co	Philadelphia, Pa.		½														
Voltacar*	Cyco-Electric Car Co	New York City	¼															
Vulcan	Driggs-Seabury Ordnanace Corp	Sharon, Pa.							2½		3½		4⅝		5¼			7½
Wagenhals	Wagenhals Motor Car Co.	Detroit, Mich.	⅜															
Wagenhals	Wagenhals Motor Car Co.	Detroit, Mich	¼															
Walker*	Walker Vehicle Co	Chicago, Ill.		½		1		2	2½		3½							
Walter	Walter Motor Truck Co.	New York City												5		6	7½	12T
Ward*	Ward Motor Vehicle Co.	Mount Vernon, N. Y	⅜	½		1		2			3½			5				
Ware	Ware Motor Vehicle Co.	St. Paul, Minn								3								
Washington	Washington Motor Car Co.	Hyattsville, Md.												5		6		7
Waverley*	Waverley Co	Indianapolis, Ind	¼	½		1		2			3½			5				
West Coast	West Coast Wagon Co	Tacoma, Wash																
White	White Co	Cleveland, O			¾		1½			3				5				
Whitwood	Whitwood Corp.	Weedsport, N. Y.																
Wichita	Wichita Falls Motor Co	Wichita Falls, Texas				1		2			3½							
Wilcox	H. E. Wilcox Motor Car Co	Minneapolis, Minn.		½		1		2		3								
Willet	Willet Engine & Carbureter Co	Buffalo, N. Y.			¾			2		3								
Willys	Willys Overland Co	Toledo, O.			¾													
Wilson	J. C. Wilson & Co.	Detroit, Mich.						2										
Witt-Will	Witt-Will Co	Washington, D. C.				1		2				4						
Zimmerman	Zimmerman Mfg. Co.	Auburn, Ind		½														

*Electric. *Electric industrial (indoor). †Steam.

Capacity Classification of 1915 Commercial Vehicles

Truck Features, Prices, Horsepower, Etc., Given

TRUCKS UNDER ½-TON CAPACITY

Name and Model	Capacity, Pounds	Chassis Price	Wheelbase	Tires	Motor Horsepower	Gearset Type	Final Drive	Feature
Brasie, Packet	600	$375	100	Pneu.	10.00	Fric.	Dbl chn.	Price
Decatur, VI	800	630	102	Pneu.	12.08	Selec.	Sing chn.	Rear spring
Handy Wagon, Jr.	500	390	65	Solid.	11.25	Plan.	Dbl chn.	Convertible
Handy Wagon	800	487.50	77	Solid.	13.60	Plan.	Dbl chn.	Convertible
Hupmobile, HT	800	850	106	Pneu.	16.92	Selec.	Bevel	Low floor
Lambert, VI	800	900	106	Pneu.	22.50	Fric.	Sing chn.	Friction drive
Motokart, 1&2	500	365	69	Pneu.	10.53	Fric.	Sing chn.	Price
Overland, 81	800	850-c*	106	Pneu.	25.60	Selec.	Bevel	Standard car
Paulding, O	800	650	95	Pneu.	12.08	Selec.	Bevel	Standard car
Saxon, A2	400	395-c	96	Pneu.	11.23	Prog.	Bevel	Price
Trumbull, 15D	500	395-c	80	Pneu.	13.37	Selec.	Bevel	Price
Wagenhals	800	690-c	80	P&C	19.61	Plan.	Sing chn.	3-wheeler

TRUCKS OF ½-TON CAPACITY

Name and Model	Capacity, Pounds	Chassis Price	Wheelbase	Tires	Motor Horsepower	Gearset Type	Final Drive	Feature
Bauer, A	1,000	$900	100	Solid.	22.50	Selec.	Dbl-red.	Double-red. drive
Best, A	1,200	750	78	Solid*	16.20	Fric.	Dbl chn.	Friction drive
Chase, S	1,000	750	98	Solid.	2-cyc.	Plan.	Dbl chn.	2-cycle motor
Dart, A	1,000	845	100	Pneu.	34.28	Selec.	Bevel	Standard car
Gabriel, K	1,000	1,200	112	Pneu.	19.61	Selec.	Bevel	Standard car
Handy Wagon, Sr.	1,200	600	86	Solid.	18.10	Plan.	Dbl chn.	Convertible
IHC, M	1,000	.....	90	Solid.	16.20	Ind-c.	Dbl chn.	High wheels
Kosmath, 14	1,000	850	110	Pneu.	19.61	Selec.	Bevel	Standard car
Mercury, P	1,000	.....	84	Solid.	14.50	Plan.	Dbl chn.	Air cooled
O. K., C&D	1,200	875	112	Pneu.	19.61	Selec.	Bevel	Standard car
Sternberg	1,000	850-c	88	Pneu.	12.08	Selec.	Worm	Worm drive
Vim, L&S	1,000	620	94	Pneu.	12.40	Selec.	Bevel	Price
Wilcox, T	1,000	1,000	115	Pneu.	19.61	Selec.	Bevel	Standard car

TRUCKS OF ¾-TON CAPACITY

Name and Model	Capacity, Pounds	Chassis Price	Wheelbase	Tires	Motor Horsepower	Gearset Type	Final Drive	Feature
Atterbury, AW	1,500	$1,800	118	Pneu.	19.61	Selec.	Worm	Worm drive
Auglaize, H	1,500	950	100	Solid.	22.10	Selec.	Bevel	Governor
Auglaize, D	1,500	950	100	Solid.	22.50	Selec.	Bevel	Governor
Bauer, B	1,500	1,150	110	Solid.	22.50	Selec.	Dbl-red.	Double red. drive
Brockway, G	1,500	1,205	100	Solid.	19.61	Selec.	Dbl chn.	Wood frame
Buick, C4	1,500	1,150	120	Pneu.	22.50	Selec.	Bevel	Valves in head
Chase, T	1,500	1,500	135	Solid.	19.61	Selec.	Worm	Worm drive
Commerce, S	1,500	875	107	Pneu.	19.61	Selec.	Bevel	Cast radiator
Crown, A	1,500	2,000	120	Pneu.	22.50	Selec.	Worm	Worm drive
Denby, A	1,500	1,500	120	Solid.	19.61	Selec.	Int-g.	Int-gear drive
Dorris, 1A4	1,500	1,950	132*	Pneu.	30.65	Selec.	Bevel	Valves in head
Fargo, E	1,500	750	100	Solid.	16.20	Fric.	Bevel	Price
Gabriel, H	1,500	1,600	126	Pneu.	22.50	Selec.	Bevel	Standard car
Geneva, B	1,500	700	96	Solid.	21.10	Plan.	Dbl chn.	Price
GMC, 15	1,500	1,090	122	Pneu.	19.61	Selec.	Bevel	Standard car
Independent, F	1,500	1,285	112*	Solid.	19.61	Selec.	Worm	Worm drive
Jeffery, 1515	1,500	1,300	118	Pneu.	22.50	Selec.	Bevel	Standard car
Kisselkar, 1500	1,500	1,500	125	Pneu.	29.00	Selec.	Bevel	Standard car
Lambert, V2	1,500	1,125	114	Pneu*	22.50	Fric.	Dbl chn.	Friction drive
Lippard-Stewart, B*	1,500	1,650	115*	Pneu.	22.50	Selec.	Bevel	French hood
Lipp.-Stewart, BW*	1,500	1,775	115*	Pneu.	22.50	Selec.	Worm	Worm drive
McIntyre, E	1,500	.....	120	Solid.	22.50	Selec.	Dbl chn.	Standard car
Menominee, A3	1,500	1,125	112	Solid.	22.50	Selec.	Bevel	Standard car
Moreland, 7X	1,500	1,800	126	Solid*	22.50	Selec.	Worm	Distillate fuel
Paulding, H	1,500	950	120	Solid.	19.61	Selec.	Dbl chn.	Standard car

TRUCKS OF ¾-TON CAPACITY—Continued

Name and Model	Capacity, Pounds	Chassis Price	Wheelbase	Tires	Motor Horsepower	Gearset Type	Final Drive	Feature
Republic, 1500	1,500	.....	124	Solid*	19.61	Selec.	Int-g.	Int-gear drive
Sanford, O	1,500	1,290	120	Solid*	19.61	Selec.	Int-g.	Int-gear drive
Standard, O-DX	1,500	1,700	.....	Pneu.	25.60	Selec.	Worm	Worm drive
Stegeman	1,500	1,600	125	Pneu.	22.50	Selec.	Bevel	Standard car
Stewart, B	1,500	1,500	124	Pneu.	19.61	Selec.	Bevel	French hood
Studebaker, 5	1,500	985	108	Pneu.	19.61	Selec.	Bevel	Price
Tiffin, A	1,500	1,600	112	Solid.	22.50	Selec.	Dbl chn.	Standard car
White, GBBE	1,500	2,100	133	Pneu.	22.50	Selec.	Bevel	Standard car
Willet, N	1,500	1,600	125	Pneu.	22.50	Selec.	Dbl-red.	Double red. drive
Willys, 65	1,500	1,350	120	P&S	27.20	Selec.	Dbl chn.	Tire equipment

TRUCKS OF 1-TON CAPACITY

Name and Model	Capacity, Pounds	Chassis Price	Wheelbase	Tires	Motor Horsepower	Gearset Type	Final Drive	Feature
Adams, A	2,000	$1,850	121*	Solid.	22.50	Selec.	Dbl chn.	French hood
Armleder, B	2,000	2,200	136	Pneu.	27.20	Selec.	Bevel	High wheels
Atterbury, BW	2,000	2,100	137	Solid.	22.50	Selec.	Worm	Worm drive
Available	2,000	.....	Opt.	Solid.	19.61	Selec.	Worm	Worm drive
Avery, C	2,000	1,690	128	Solid.	27.20	Selec.	Dbl chn.	Standard car
B. A. Gramm, 1	2,000	1,750	130	Solid.	22.50	Selec.	Dbl chn.	Standard car
Barker, U	2,000	2,000	130	Solid.	25.60	Selec.	Worm	Worm drive
Bessemer, C	2,000	1,250	108	Solid.	19.61	Selec.	Dbl chn.	Standard car
Brockway, H	2,500	1,500	112*	Solid.	22.50	Selec.	Dbl chn.	Wood frame
Coleman, D	2,000	1,950	112	Solid.	22.50	Selec.	Dbl chn.	Standard car
Corbitt, F	2,500	2,000	130	Solid.	22.50	Selec.	Dbl chn.	Made in South
Dart	2,000	1,400	114	Solid.	19.61	Selec.	Dbl chn.	Standard car
Dayton, U	2,000	1,800	118½	Solid.	29.00	Selec.	Dbl chn.	.....
Decatur, C	2,000	1,500	Opt.	Solid*	22.50	Selec.	Int-g.	Int-gear drive
Denby, B	2,000	1,600	120	Solid.	19.61	Selec.	Int-g.	Int-gear drive
Fargo, F	2,000	1,250	130	Solid.	22.50	Selec.	Dbl-red.	Double-red. drive
Flint, C	2,000	1,285*	106	Solid.	22.50	Selec.	Dbl-red.	Double-red. drive
GMC, VC	2,500	1,500	126	Solid.	19.61	Selec.	Dbl chn.	Cast radiator
Horner, 1	2,000	2,000	145	Solid.	27.20	Selec.	Dbl chn.	French hood
Hurlburt, 1	2,000	1,500	120	Pneu.	22.50	Selec.	Worm	Worm drive
Kelly, K30	2,000	2,000	120*	Solid.	22.50	Selec.	Dbl chn.	French hood
Kisselkar, 1	2,000	1,850	140	Pneu.	32.40	Selec.	Bevel	Standard car
Koehler, 1	2,000	725	90	Solid*	22.10	Plan.	Dbl chn.	Price
Krebs, G	2,000	1,900	118	Solid.	22.50	Selec.	Worm	Variable governor
Lambert, V3	2,000	.....	120	Solid.	26.27	Fric.	Dbl chn.	Friction drive
Lippard-Stewart, H.	2,000	2,000	145	Solid.	22.50	Selec.	Worm	Worm drive
Little Giant, H	2,000	1,350	110	Solid.	22.50	Selec.	Dbl chn.	Motor under floor
Maccar, B	2,000	1,900	138*	Solid.	27.20	Selec.	Dbl chn.	Standard car
Maccar, E	2,000	1,900	138*	Solid.	27.20	Selec.	Worm	Worm drive
Martin, R	2,000	2,050	125	Solid.	25.60	Selec.	Dbl chn.	Standard car
Menominee, B3	2,000	1,400	122	Solid.	25.60	Selec.	Dbl-red.	Double-red drive
Modern, L	2,000	1,750	136	Solid*	22.50	Selec.	Worm	Worm drive
Natco, 20	2,000	1,025	104	Solid.	19.61	Selec.	Dbl chn.	Motor betw. seats
Nel. & LeMoon, E1	2,000	1,800	Opt.	Solid.	22.50	Selec.	Worm	Worm drive
Palmer-Moore, D	2,000	1,300	102	Solid.	2-cyc.	Selec.	Dbl chn.	2-cycle motor
Paulding, G	2,000	1,300	120	Solid.	25.60	Selec.	Dbl chn.	Standard car
Republic, 1	2,000	1,350	124	Solid.	22.50	Selec.	Dbl chn.	Standard car
Roland, 1	2,000	2,000	120	Solid.	22.50	Selec.	Dbl chn.	Gas-electric
Service, W	2,000	2,000	135	Solid.	22.50	Selec.	Worm	Worm drive
Signal, D	2,000	1,400	120	Solid.	22.50	Selec.	Dbl chn.	Standard car
Signal, DL	2,000	1,450	144	Solid.	22.50	Selec.	Dbl chn.	Standard car
Signal, F	2,000	1,500	120	Solid.	22.50	Selec.	Worm	Worm drive
Signal, FL	2,000	1,550	144	Solid.	22.50	Selec.	Worm	Worm drive
Standard, O-A	2,000	1,700	134	Solid*	25.60	Selec.	Dbl chn.	Standard car
Standard, O-AX	2,000	1,900	124	Solid*	25.60	Selec.	Worm	Worm drive
Stewart, K-C	2,000	1,100	96	Solid.	20.00	Plan.	Dbl chn.	Motor under seats
Tiffin, G	2,000	2,000	128	Solid.	22.50	Selec.	Dbl chn.	Standard car
Trabold, T	2,000	1,250	118	Solid.	19.61	Selec.	Worm*	Worm drive
Transit, E	2,000	2,000	120*	Solid.	32.40	Selec.	Dbl chn.	Opt. motor locat'n
Velie, X	2,000	2,000	129*	Solid*	34.28	Selec.	Dbl-red.	Double-red. drive
Wichita, A	2,000	1,650	110	Solid.	16.92	Selec.	Dbl chn.	Standard car
Wilcox, LA	2,000	2,000	132	Solid*	27.20	Selec.	Dbl chn.	Standard car

TRUCKS OF 1½-TON CAPACITY

Name and Model	Capacity, Pounds	Chassis Price	Wheelbase	Tires	Motor Horsepower	Gearset Type	Final Drive	Feature
Adams, D	3,000	$2,300	121*	Solid.	27.20	Selec.	Dbl chn.	French hood
Aetna, 1½	3,000	2,150	158	Solid.	25.60	Selec.	Worm	Worm drive

ABBREVIATIONS: General, *, *with other options;* Opt, *optional.* **Price,** -c, *complete with body.* **Tires, Kind,** Pneu, *pneumatic;* Sol-st, *solid in front, steel in rear;* P&S, *pneumatic in front, solid in rear:* P&C, *pneumatic in front, cushion in rear;* C&S, *cushion in front, solid in rear.* **Gearset Type,** Prog, *progressive sliding gear;* Selec, *selective sliding gear;* Plan, *planetary;* Ind-c, *constant-mesh individual-clutch;* Fric, *friction;* Hyd, *hydraulic;* Elec, *electric.* **Final Drive,** Bevel, *direct bevel;* Dbl-red, *double-reduction bevel and spur;* Int-g, *internal-gear;* Worm, *worm gear with worm on top;* Dbl chn, *double chain;* Sing chn, *single chain;* -f, *to front wheels;* -4, *to all four wheels.*

TRUCKS OF 1½-TON CAPACITY—Continued

Name and Model	Capacity, Pounds	Chassis Price	Wheelbase	Tires	Motor Horsepower	Gearset Type	Final Drive	Feature
Armleder, H	3,000	$2,150	Opt	Solid	32.40	Selec	Dbl chn	High wheels
Autocar, 21F	3,000	1,850	97	Opt	18.10	Prog	Dbl-red	Motor under
Bessemer, A	3,000	1,800	136	Solid	27.20	Selec	Dbl chn	Standard car seat
Beck	3,000	1,600	130	Solid	27.20	Selec	Int-g	Int-gear drive
Chase, R	3,000	2,300	Opt	Solid	22.50	Selec	Worm	Worm drive
Continental, F	3,000	1,700	144	Solid	16.92	Selec	Opt	Standard car
Crown, B	3,000	2,500	140	Solid	25.60	Selec	Worm	Worm drive
DeKalb, D1	3,000	1,950	134	Solid	27.20	Selec	Dbl chn	Standard car
Federal, GH	3,000	1,800	120*	Solid	27.20	Selec	Dbl chn	Cast radiator
Federal, GW-HW	3,000	1,900	120*	Solid	27.20	Selec	Worm	Worm drive
Forschler, 1A	3,000	2,300	124*	Solid	27.20	Selec	Dbl chn	Double frame
Gabriel, M	3,000	2,300	144	Pneu	27.20	Selec	Bevel	Standard car
Gramm, 1½	3,000	2,600	129	Solid	22.50	Selec	Dbl chn	Motor betw. seats
Harvey, F	3,000	1,800	130	Solid	22.50	Selec	Dbl chn	Standard car
Independent, E	3,000	1,850	122*	Solid	22.50	Selec	Dbl chn	Standard car
Indiana, B	3,000	1,800	135	Solid	22.50	Selec	Dvl chn	Standard car
Jeffery, 3015	3,000	1,650	130	Solid	22.50	Selec	Dbl chn	Standard car
Kalamazoo, B	3,000	1,590	126	Solid	22.50	Selec	Dbl chn	Standard car
Kisselkar, 1½	3,000	2,100	132*	Solid	29.00	Selec	Dbl chn	Standard car
Klieber, 1	3,000	2,000	140*	Solid	27.20	Selec	Dbl chn	Standard car
Lambert, V4	3,000	1,900	120	Solid	32.40	Fric	Dbl chn	Friction drive
Lange, C	3,000	2,250	125	Solid	22.50	Ind-c	Dbl chn	Ind-clutch gearset
Lippard-Stewart, F	3,000	2,300	145*	Solid	27.20	Selec	Worm	Worm drive
Maccar, C	3,000	2,150	150*	Solid	27.20	Selec	Dbl chn	Standard car
Mais, C	3,000	2,750	119	Solid	25.60	Prog	Int-g	Int-gear drive
Mais, D	3,000	2,800	132	Solid	25.60	Prog	Int-g	Int-gear drive
Martin, S	3,000	2,150	121	Solid	25.60	Selec	Dbl chn	Standard car
McIntyre, A	3,000	.....	144	Solid	27.20	Selec	Dbl chn	Standard car
Menominee, C	3,000	1,800	130	Solid	25.60	Selec	Dbl-red	Double-red. drive
Modern, H	3,000	1,950	136*	Solid	27.20	Selec	Dbl chn	Standard car
Modern, M	3,000	2,000	136*	Solid	27.20	Selec	Worm	Worm drive
Moon, B	3,000	1,800	125*	Solid	22.50	Selec	Dbl chn	Standard car
Moore, 1½	3,000	1,950	145	Solid	27.20	Selec	Dbl chn	Standard car
Moreland, 1X	3,000	2,050	120	Solid	27.20	Selec	Worm	Distillate fuel
Nel. & LeMoon, E1½	3,000	2,000	Opt	Solid	27.20	Selec	Worm	Worm drive
Netco, C	3,000	2,250	144	Solid	27.20	Selec	Worm	Worm drive
New York, L	3,000	2,000	129	Solid	16.92	Selec	Dbl chn	Standard car
Old Hickory, 30W	3,000	1,900	110	Solid	22.50	Selec	Worm	Worm drive
Old Reliable, 1½	3,000	2,250	138	Solid	22.50	Selec	Worm	Worm drive
Republic, 1½	3,000	1,475	144	Solid	22.50	Selec	Dbl chn	Price
Rowe, CW	3,000	2,450	144	Solid	25.60	Selec	Worm	Worm drive
Sandow, 1½	3,000	1,900	125*	Solid	22.50	Selec	Dbl chn	Standard car
Sanford, K	3,000	1,660	106	Solid	25.60	Selec	Dbl chn	Standard car
Selden, JB	3,000	2,000	150	Solid	22.50	Selec	Dbl chn	Standard car
Service, Q	3,000	1,975	150	Solid	27.20	Selec	Dbl chn	Standard car
Standard, O-B	3,000	1,800	132*	Solid	25.60	Selec	Dbl chn	Standard car
Standard, O BX	3,000	2,100	134*	Solid	25.60	Selec	Worm	Worm drive
Stegeman	3,000	2,100	150	C&S	22.50	Selec	Dbl chn	Chain cases
Sullivan, G	3,000	1,600	129	Solid	22.50	Selec	Dbl chn	Standard car
Universal, C	3,000	1,950	132	Solid	22.50	Selec	Worm	Worm drive
Velie, U	3,000	2,250	140	Solid	34.28	Selec	Worm	Worm drive
White, TBC	3,000	3,000	145½	Pneu	22.50	Selec	Dbl-red	Double-red. drive

TRUCKS OF 2-TON CAPACITY

Name and Model	Capacity, Pounds	Chassis Price	Wheelbase	Tires	Motor Horsepower	Gearset Type	Final Drive	Feature
Adams, E	4,000	$2,500	140*	Solid	27.20	Selec	Dbl chn	French hood
Armleder, E	4,000	2,500	Opt	Solid	32.40	Selec	Dbl chn	High wheels
Atterbury, CW	4,000	2,800	153	Solid	27.20	Selec	Worm	Worm drive
Available	4,000	.....	Opt	Solid	27.20	Selec	Worm	Worm drive
Avery, B	4,000	2,700	128	Solid	36.15	Selec	Dbl chn	Motor under floor
B. A. Gramm, 2	4,000	2,550	146	Solid	29.00	Ind-c	Worm	Worm drive
Barker, V	4,000	2,400	136	Solid	25.60	Selec	Worm	Worm drive
Bessemer, D	4,000	2,300	136	Solid	27.20	Selec	Worm	Worm drive
Blair, C1	4,000	2,850	114*	Solid	27.20	Ind-c	Worm	Worm drive
Brasie, Twin City	4,000	1,350	104	Solid	20.00	Plan	Dbl chn	Price
Brasie, Twin City	4,000	1,350	104	Solid	22.50	Selec	Dbl chn	Price
Brockway, I	4,000	1,875	120*	Solid	27.20	Selec	Dbl chn	Wood frame
Coleman, G	4,000	2,450	124	Solid	22.50	Selec	Dbl chn	Motor under seats
Curtis	4,000	2,750	130	Solid	27.20	Selec	Dbl chn	Motor under floor
Dart	4,000	1,800	130*	Solid	27.20	Selec	Dbl chn	Standard car
Dorris, 1A4	4,000	2,500	144*	Solid	30.65	Selec	Dbl chn	Valves in head
Duplex, C	4,000	2,800	130	Solid	27.20	Selec	Int-g	4-wheel drive
Four Wheel Drive, G	4,000	3,400	124	Solid	29.00	Selec	Bevel-4	4-wheel drive
Fremont-Mais, O	4,000	1,700*	132*	Solid	22.50	Prog	Int-g	Int-gear drive
Garford, L	4,000	3,000	128*	Solid	36.15	Selec	Dbl chn	Motor betw. seats
G. A. Schacht, 2	4,000	2,800	138	Solid	29.00	Selec	Worm	Worm drive
GMC, SC	4,000	1,900	143	Solid	25.60	Selec	Dbl chn	Standard car
Gramm, 2	4,000	3,600	128	Solid	32.40	Selec	Dbl chn	Motor betw. seats

TRUCKS OF 2-TON CAPACITY—Continued

Name and Model	Capacity, Pounds	Chassis Price	Wheelbase	Tires	Motor Horsepower	Gearset Type	Final Drive	Feature
Horner, 2	4,000	$2,650	145	Solid	27.20	Selec	Dbl chn	French hood
Hurlburt, 2	4,000	3,000	Opt	Solid	27.20	Selec	Worm	Worm drive
Jeffery, 4015	4,000	2,750	124	Solid	22.50	Selec	Int-g-4	4-wheel drive
Kelly, K-35	4,000	2,750	144*	Solid	22.50	Selec	Dbl chn	French hood
Krebs, H	4,000	2,350	144*	Solid	27.20	Selec	Worm	Variable governor
Lambert, V5	4,000	2,300	120	Solid	32.40	Fric	Dbl chn	Friction drive
Lippard-Stewart, G	4,000	2,600	158*	Solid	27.20	Selec	Worm	Worm drive
Maccar, F	4,000	2,400	150*	Solid	27.20	Selec	Dbl chn	Standard car
Maccar, D	4,000	2,400	150*	Solid	27.20	Selec	Worm	Worm drive
Mais, E	4,000	2,950	132	Solid	25.60	Prog	Int-g	Int-gear drive
Mais, F	4,000	3,000	145	Solid	25.60	Prog	Int-g	Int-gear drive
Moore, 2	4,000	2,500	163	Solid	32.40	Selec	Dbl chn	Standard car
Nel. & LeMoon, E2	4,000	2,250	Opt	Solid	27.20	Selec	Worm	Worm drive
Packard, 2	4,000	2,800	120*	Solid	26.39	Prog	Dbl chn	Standard car
Paulding, M	4,000	1,950	145	Solid	34.28	Selec	Dbl chn	Standard car
Pierce-Arrow, 2	4,000	3,000	150*	Solid	25.60	Selec	Worm	Worm drive
Reo, J	4,000	1,650	130*	Solid	27.20	Selec	Dbl chn	Knock-down rad.
Rowe, DW	4,000	2,800	150	Solid	29.00	Selec	Worm	Worm drive
Sandow, 2	4,000	2,250	125*	Solid	27.20	Selec	Dbl chn	Standard car
Sanford, L	4,000	1,910	118	Solid	27.20	Selec	Dbl chn	Motor under floor
Sanford, M	4,000	1,910	140	Solid	27.20	Selec	Dbl chn	Standard car
Service, P	4,000	2,375	150	Solid	27.20	Selec	Dbl chn	Standard car
Service, PW	4,000	2,500	160	Solid	27.20	Selec	Worm	Worm drive
South Bend, 40	4,000	2,000	136*	Pneu*	26.50	Selec	Dbl chn	Standard car
Speedwell, 8Y	4,000	2,850	115	Solid	27.20	Selec	Dbl chn	Motor under floor
Standard, O-C	4,000	2,000	144*	Solid*	25.60	Selec	Dbl chn	Standard car
Sternberg	4,000	2,800	148*	Solid	22.50	Ind-c	Worm	Worm drive
Trabold	4,000	2,450	130	Solid	27.20	Selec	Worm*	Worm drive
Transit, F	4,000	2,850	144	Solid	32.40	Selec	Dbl chn	Opt. motor locat'n
U. S., E	4,000	2,550	132	Solid	27.20	Ind-c	Dbl chn	Ind.-clutch gears't
Wichita, B	4,000	2,100	118	Solid	19.61	Selec	Dbl chn	Standard car
Wilcox, NA	4,000	2,500	118	Solid	29.00	Selec	Dbl chn	Motor under floor
Willet, L	4,000	2,600	144	Solid	27.20	Selec	Dbl chn	French hood
Wilson, B	4,000	1,800	130*	Solid	27.20	Selec	Dbl chn	Standard car

TRUCKS OF 2½-TON CAPACITY

Name and Model	Capacity, Pounds	Chassis Price	Wheelbase	Tires	Motor Horsepower	Gearset Type	Final Drive	Feature
Aetna, 2½	5,000	$2,400	158	Solid	34.28	Selec	Worm	Worm drive
Beck	5,000	1,850	130	Solid	40.00	Selec	Int-g	Int-gear drive
Crown, C	5,000	3,000	150	Solid	29.00	Selec	Worm	Worm drive
DeKalb, D2	5,000	2,450	136	Solid	27.50	Selec	Dbl chn	Standard car
Kisselkar, 2½	5,000	2,750	144*	Solid	32.40	Selec	Dbl chn	Standard car
Kleiber, 2	5,000	2,750	150*	Solid	27.20	Selec	Dbl chn	Standard car
Lange, B	5,000	3,000	136	Solid	27.20	Ind-c	Dbl chn	Ind.-clutch gears't
Lewis, 21	5,000	2,900	144	Solid	29.00	Ind-c	Dbl chn	Ind.-clutch gears't
Mais, G	5,000	3,200	145	Solid	29.69	Prog	Int-g	Int-gear drive
Martin, E	5,000	3,000	135	Solid	27.20	Selec	Dbl chn	Motor under floor
Moreland, 2X	5,000	2,650	144	Solid	32.40	Selec	Worm	Distillate fuel
Stegeman	5,000	2,800	142	Solid	29.00	Selec	Dbl chn	Chain cases
U. S., G	5,000	2,750	138	Solid	27.20	Ind-c	Dbl chn	Ind.-clutch gears't
Velie	5,000	2,850	148*	Solid	32.40	Selec	Dbl chn	Standard car
Vulcan, 2	5,000	2,750	150*	Solid	29.99	Selec	Dbl chn	English design

TRUCKS OF 3-TON CAPACITY

Name and Model	Capacity, Pounds	Chassis Price	Wheelbase	Tires	Motor Horsepower	Gearset Type	Final Drive	Feature
A & B, 3-T	6,000	.....	144	Solid	42.76	Elec	Int-g-f	Gas-electric
Atterbury, DW	6,000	$3,800	168	Solid	32.40	Selec	Worm	Worm drive
Avery, A	6,000	2,500e	140	Wood	36.15	Selec	Dbl chn	Farm truck
Avery, B	6,000	3,200	128	Solid	36.15	Selec	Dbl chn	Motor under floor
Blair, B1	6,000	3,250	120*	Solid	36.15	Ind-c	Worm	Worm drive
Chase, O	6,000	3,300	175	Solid	32.40	Selec	Worm	Worm drive
Coleman, H	6,000	3,000	134	Solid	27.20	Selec	Dbl chn	Motor under seat
Continental, G	6,000	2,700	144	Solid	16.92	Selec	Opt	Standard car
Crawford	6,000	3,000	144	Solid	32.40	Selec	Dbl chn	Standard car
Curtis	6,000	3,250	130	Solid	27.20	Selec	Dbl chn	Motor under floor
Duplex, D	6,000	3,200	130	Solid	29.00	Selec	Int-g-4	4-wheel drive
Four Wheel Drive, B	6,000	4,000	124	Solid	36.15	Selec	Bevel-4	4-wheel drive
Garford, J	6,000	3,500	128*	Solid	36.15	Selec	Dbl chn	Motor betw. seats
G. A. Schacht, 3	6,000	3,200	150	Solid	29.00	Selec	Worm	Worm drive
Harvey, H	6,000	3,000	168	Solid	29.00	Selec	Dbl chn	Stndard car
Horner, 3	6,000	3,200	145	Solid	32.40	Selec	Dbl chn	French hood
Indiana, F	6,000	2,500	144	Solid	29.00	Selec	Dbl chn	Standard car

ABBREVIATIONS: General, *, *with other options;* Opt, *optional.* **Price,** -c, *complete with body.* **Tires, Kind,** Pneu, *pneumatic;* Sol-st, *solid in front, steel in rear;* P&S, *pneumatic in front, solid in rear;* P&C, *pneumatic in front, cushion in rear;* C&S, *cushion in front, solid in rear.* **Gearset Type,** Prog, *progressive sliding gear;* Selec, *selective sliding gear;* Plan, *planetary;* Ind-c, *constant-mesh individual-clutch;* Fric, *friction;* Hyd, *hydraulic;* Elec, *electric.* **Final Drive,** Bevel, *direct bevel;* Dbl-red, *double-reduction, bevel and spur;* Int-g, *internal-gear;* Worm, *worm gear with worm on top;* Dbl chn, *double chain;* Sing chn, *single chain;* -f, *to front wheels;* -4, *to all four wheels.*

TRUCKS OF 3-TON CAPACITY—Continued

Name and Model	Capacity, Pounds	Chassis Price	Wheelbase	Tires	Motor Horsepower	Gearset Type	Final Drive	Feature
Lewis, 31	6,000	$3,250	144	Solid..	29.00	Ind-c..	Dbl chn.	Opt. motor locat'n
Locomobile, 3	6,000	3,500	150*	Solid..	29.00	Selec..	Worm..	Worm drive
Mais, H	6,000	3,400	160	Solid..	29.69	Prog..	Int-g....	Int-gear drive
McIntyre, G	6,000	.....	144	Solid..	27.20	Selec..	Dbl chn.	Standard
Moore, 3	6,000	3,150	142	Solid..	32.40	Selec..	Dbl chn.	Motor under floor
Old Reliable, 3	6,000	3,400	122	Solid..	29.00	Selec..	Dbl chn.	Motor under floor
Packard, 3	6,000	3,400	126*	Solid..	32.40	Prog..	Dbl chn.	Standard car
Peerless, 3	6,000	3,700	151*	Solid..	32.40	Selec..	Dbl chn.	Standard car
Roland, 3	6,000	3,500	144	Solid..	29.00	Elec..	Worm...	Gas-electric
Rowe, EW	6,000	3,400	156	Solid..	25.60	Selec..	Worm...	Worm drive
Sandow, 3	6,000	3,000	147*	Solid..	32.40	Selec..	Dbl chn.	Standard car
Service, H	6,000	2,975	171	Solid..	29.00	Selec..	Dbl chn.	Standard car
Standard, D-3	6,000	2,750	144	Solid..	32.40	Prog..	Worm*..	Worm drive opt.
Sternberg	6,000	3,400	158*	Solid..	29.00	Ind-c..	Worm...	Worm drive
Trabold	6,000	3,300	130	Solid..	29.00	Selec..	Worm*..	Worm drive
U. S., D	6,000	3,200	144	Solid..	32.40	Ind-c..	Dbl chn.	Ind.-clutch gears't
Universal, A	6,000	3,400	132	Solid..	25.60	Selec..	Dbl chn.	Motor under floor
Ware	6,000	.....	.....	Solid..	25.60	.....	Bevel...	4-wheel drive
White, TAD	6,000	3,700	163	Solid..	22.50	Selec..	Dbl chn.	Standard car
Wilcox, JA	6,000	3,250	128	Solid..	29.00	Selec..	Dbl chn.	Motor under floor
Willet, K	6,000	2,800	144	Solid..	32.40	Selec..	Dbl chn.	French hood

TRUCKS OF 3½-TON CAPACITY

B. A. Gramm, 3½	7,000	$3,400	158	Solid..	29.00	Ind-c..	Worm...	Worm drive
Couple-Gear, H. C	7,000	4,850	144	Solid..	44.20	Elec..	Bevel-4..	Gas-electric
GMC, HU	7,000	2,500	158	Solid..	40.00	Prog..	Dbl chn.	Standard car
Gramm, 3½	7,000	4,600	140	Solid..	32.40	Selec..	Dbl chn.	Motor betw. seats
Hurlburt, 3½	7,000	3,500	Opt...	Solid..	29.00	Selec..	Worm...	Worm drive
Kelly, K-40	7,000	3,400	150*	Solid..	32.40	Selec..	Dbl chn.	French hood
King, 3½	7,000	3,200	120	Solid..	32.40	Ind-c..	Dbl chn.	Motor under floor
Kisselkar, 3½	7,000	3,350	162	Solid..	38.25	Selec..	Dbl chn.	Standard car
Kleiber, 3	7,000	3,300	160*	Solid..	32.40	Selec..	Dbl chn.	Standard car
M&E, B	7,000	3,350	132	Solid..	32.40	Selec..	Dbl chn-f	Front drive
Martin, L	7,000	3,500	145	Solid..	36.15	Selec..	Dbl chn.	Motor under floor
Moreland, 3X	7,000	3,500	168	Solid..	36.15	Selec..	Worm...	Distillate fuel
Roland, 3½	7,000	3,500	156	Solid..	32.40	Elec..	Dbl chn.	Gas-electric
Royal, B3½	7,000	3,400	132	Solid..	36.15	Ind-c..	Dbl chn.	Motor under floor
Smith, A	7,000	3,750	168	Solid..	40.00	Ind-c..	Worm...	Worm drive
Standard, O-C	7,000	3,200	162	Solid..	30.65	Selec..	Dbl chn.	Standard car
Stegeman	7,000	3,350	155*	Solid..	32.50	Selec..	Dbl chn.	Chain cases
Transit, T	7,000	3,500	144	Solid..	32.40	Selec..	Dbl chn.	Opt. motor locat'n
Vulcan, 3	7,500	3,250	156*	Solid..	29.99	Selec..	Dbl chn.	English design
Wichita, H	7,000	3,250	165	Solid..	29.00	Selec..	Dbl chn.	Standard car

TRUCKS OF 4-TON CAPACITY

Blair, E1	8,000	$3,750	135*	Solid..	36.15	Ind-c..	Worm...	Worm drive
Dayton, A	8,000	2,700	136	Solid..	36.15	Selec..	Dbl chn.	Motor under floor
Garford, K	8,000	3,850	128*	Solid..	36.15	Selec..	Dbl chn.	Motor betw. seats
Locomobile	8,000	3,650	150*	Solid..	29.00	Selec..	Worm...	Worm drive
Moore, 4	8,000	3,500	153	Solid..	36.15	Selec..	Dbl chn.	Motor under floor
Old Reliable, 4	8,000	4,000	126	Solid..	36.15	Selec..	Dbl chn.	Motor under floor
Packard, 4	8,000	3,500	126*	Solid..	32.40	Prog..	Dbl chn.	Standard car
Peerless, 4	8,000	4,000	151*	Solid..	32.40	Selec..	Dbl chn.	Standard car
South Bend, 80	8,000	3,000	152	Pneu*.	44.20	Selec..	Dbl chn.	Standard car
Speedwell, 10Z	8,000	3,750	115	Solid..	40.00	Selec..	Dbl chn.	Motor under floor
U. S., F	8,000	3,550	156	Solid..	32.40	Ind-c..	Dbl chn.	Ind.-clutch gears't
Velie, Z	8,000	3,350	148*	Solid..	32.40	Selec..	Dbl chn.	Standard car

TRUCKS OF 4½-TON CAPACITY

Vulcan, 4	9,200	$4,000	162	Solid..	29.99	Ind-c..	Dbl chn.	English design

TRUCKS OF 5-TON CAPACITY

Name and Model	Capacity, Pounds	Chassis Price	Wheelbase	Tires	Motor Horsepower	Gearset Type	Final Drive	Feature
A & B, 5-T	10,000	.....	144	Solid..	42.76	Elec..	Int-g-f..	Gas-electric
Atterbury, E	10,000	$4,000	153	Solid..	38.25	Selec..	Dbl chn.	Standard car
Avery, B	10,000	4,500	128	Solid..	44.20	Selec..	Dbl chn.	Motor under floor
B. A. Gramm, 5	10,000	4,300	168	Solid..	40.80	Ind-c..	Dbl chn.	Ind.-clutch gears't
Blair, F	10,000	4,500	135*	Solid..	36.15	Ind-c..	Worm...	Worm drive
Couple-Gear, AC	10,000	5,400	144	Solid..	53.00	Elec..	Bevel-4..	Gas-electric
C. T	10,000	.....	155	Solid..	25.60	Elec..	Dblred-4	Gas-electric
GMC, KU	10,000	3,000	158	Solid..	40.00	Prog..	Dbl chn.	Standard car
Garford, D	10,000	4,500	128*	Solid..	29.00	Selec..	Dbl chn.	Motor betw. seats
Gramm, 5	10,000	5,350	140	Solid..	32.40	Selec..	Dbl chn.	Motor betw. seats
Horner, 5	10,000	4,200	156	Solid..	44.20	Selec..	Dbl chn.	French hood
Indiana, K	10,000	3,200	165	Solid..	36.15	Selec..	Dbl chn.	Standard car
Kelly, K-50	10,000	4,250	150*	Solid..	32.40	Selec..	Dbl chn.	French hood
Kleiber, 5	10,000	4,000	170*	Solid..	40.00	Selec..	Dbl chn.	Standard car
LaFrance, 6	10,000	5,500	140	Solid..	48.48	Hyd..	Dbl chn.	Hydraulic drive
Locomobile, A2	10,000	4,500	140*	Solid..	40.00	Selec..	Dbl chn.	Motor under floor
M & E, G	10,000	2,750	116	Sol-st.	29.00	Selec..	Dbl chn.	Front drive
Moore, 5	10,000	4,500	175	Solid..	44.20	Selec..	Dbl chn.	Motor under floor
Moreland, 5X	10,000	4,000	168	Solid..	36.15	Selec..	Dbl chn.	Distillate fuel
Old Reliable, 5	10,000	4,000	126	Solid..	36.15	Selec..	Dbl chn.	Motor under floor
Packard, 5	10,000	4,150	144*	Solid..	40.00	Prog..	Dbl chn.	Standard car
Peerless, 5	10,000	4,500	151*	Solid..	32.40	Selec..	Dbl chn.	Standard car
Pierce-Arrow, 5	10,000	4,500	168*	Solid..	38.25	Selec..	Worm...	Worm drive
Rowe, GW	10,000	4,500	171	Solid..	36.15	.....	Worm...	Worm drive
Royal, A5	10,000	4,500	138	Solid..	36.15	Ind-c..	Dbl chn.	Motor under floor
Service, HX	10,000	4,000	175	Solid..	36.15	Selec..	Dbl chn.	Standard car
Stegeman	10,000	4,200	168	Solid..	32.40	Selec..	Dbl chn.	Chain cases
Sternberg	10,000	4,500	.....	Solid..	32.40	Ind-c..	Worm...	Worm drive
Transit, V	10,000	4,500	144*	Solid..	32.40	Selec..	Dbl chn.	Opt. motor locat'n
Velie, Z5	10,000	3,750	148*	Solid..	32.40	Selec..	Dbl chn.	Standard car
Walter, 5	10,000	4,500	144	Solid..	30.65	Selec..	Int-g-4..	4-wheel drive
White, TCD	10,000	4,500	165	Solid..	29.00	Selec..	Dbl chn.	Standard car

TRUCKS OF 5½-TON CAPACITY

Vulcan, 5	11,005	$4,500	162	Solid..	29.99	Ind-c..	Dbl chn.	English design

TRUCKS OF 6-TON CAPACITY

Daimler-Amer., FV	12,000	.....	169	Solid..	29.00	Selec..	Int-g....	German design
Four Wheel Drive, M	12,000	$4,800	148	Solid..	44.20	Selec..	Bevel-4..	4-wheel drive
Garford, F	12,000	4,850	128*	Solid..	29.00	Selec..	Dbl chn.	Motor betw. seats
Kisselkar, 6	12,000	4,350	168	Solid..	38.25	Selec..	Dbl chn.	Standard car
Knox-Tractor, 31	12,000	3,250	139	Solid..	40.00	Selec..	Dbl chn.	3-wheeler
Locomobile, AA2	12,000	4,800	140*	Solid..	40.00	Selec..	Dbl chn.	Motor under floor
Packard, 6	12,000	4,300	144*	Solid..	40.00	Prog..	Dbl chn.	Standard car
Peerless, 6	12,000	5,000	151*	Solid..	32.40	Selec..	Dbl chn.	Standard car
Smith, C	12,000	4,750	168	Solid..	44.20	Ind-c..	Worm...	Worm drive
Speedwell, 8X	12,000	4,400	139	Solid..	40.00	Selec..	Dbl chn.	Motor under floor
Sternberg	12,000	4,650	144	Solid..	36.15	Ind-c..	Dbl chn.	Motor under floor
Walter, 6	12,000	4,750	144	Solid..	30.65	Selec..	Int-g-4..	4-wheel drive

TRUCKS OF 6½-TON CAPACITY

Moreland, 6X	13,000	$4,500	168	Solid..	44.20	Selec..	Dbl chn.	Distillate fuel

TRUCKS OF 7-TON CAPACITY AND OVER

Knox-Tractor, 32	20,000	$3,750	140	Solid..	40.00	Selec..	Dbl chn.	3-wheeler
Mais, Tractor	16,000	2,750	84	Solid..	29.69	Prog..	Int-g....	Int-gear drive
Old Reliable, 7	14,000	5,000	126	Solid..	36.15	Selec..	Dbl chn.	Motor under floor
Standard, D-7	14,000	3,300	112	Solid..	32.40	Prog..	Dbl chn.	Standard car
Sternberg	14,000	4,750	144	Solid..	36.15	Ind-c..	Dbl chn.	Motor under floor
Vulcan, 7	15,500	6,000	156*	Solid..	36.15	Prog..	Dbl chn.	English design
Walter, 7½	15,000	5,000	144	Solid..	38.25	Selec..	Int-g-4..	4-wheel drive
Walter, Tractor	24,000	4,500	108	Solid..	38.25	Selec..	Int-g-4..	4-wheel drive

CAPACITIES NOT GIVEN

Bulley Tractor	.....	3,400	72	Solid..	30.65	Selec..	Dbl chn.	3-wheeler

ABBREVIATIONS: General, *, *with other options;* Opt, *optional.* **Price** -c, *complete with body.* **Tires, Kind,** Pneu, *pneumatic;* Sol-st, *solid in front, steel in rear;* P&S, *pneumatic in front, solid in rear;* P&C, *pneumatic in front, cushion in rear;* C&S, *cushion in front, solid in rear.* **Gearset Type,** Prog, *progressive sliding gear;* Selec, *selective sliding gear;* Plan, *planetary;* Ind-c, *constant-mesh individual-clutch;* Fric, *friction;* Hyd, *hydraulic;* Elec, *electric.* **Final Drive,** Bevel, *direct bevel;* Dbl-red, *double-reduction, bevel and spur;* Int-g, *internal-gear;* Worm, *worm gear with worm on top;* Dbl chn, *double chain;* Sing chn, *single chain;* -f, *to front wheels;* -4, *to all four wheels.*

Explanation of Expressions Used in the Ta

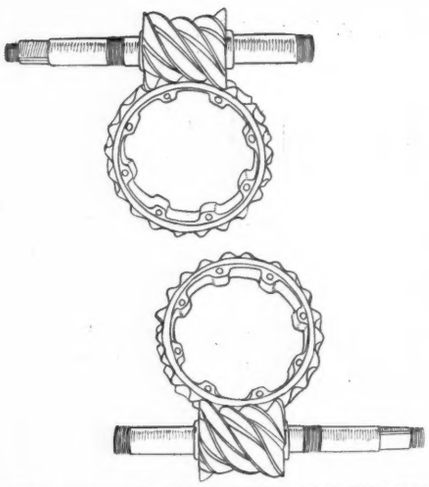


FIG. 1—ILLUSTRATING TOP AND BOTTOM WORM DRIVE

Load Capacity—The capacity given in the tables is the maximum load in pounds that the vehicle will hold with safety.

Chassis Price—The price of the car without the body. Usually a stake body is given at the price mentioned.

Wheelbase—Where a star (*) appears it means more than one wheelbase length is offered.

S. A. E. H. P.—Various formulae have been used for the horsepower rating of gas engines, but in these tables the horsepower is calculated from the formula adopted by the Society of Automobile Engineers, $D^2N \div 2.5$. Where D^2 is the square of the piston diameter or bore in inches and N is the number of cylinders. The denominator is a constant.

Valves Placed—When opposite is given one set of valves is on the right and the other on the left side of the motor. This construction is used in T-head engines. When all the valves are on one side, the motor is called an I-head. There are forms of this type in which one set is in the head and another in the side.

Cooling Systems—Thermo in the tables means thermo-syphon or natural cooling, the system requiring no pump. Advantage is taken in this system of the fact that hot water rises to the top and so makes its way to the radiator, where it is cooled. In pump cooling usually a centrifugal pump forces water through the cylinder jackets.

Radiator Type—Finned type refers to a type which is composed of a number of tubes to which are attached metal fins to which the heat radiates. In the cellular the construction is such that small cells are formed by the metal, air circulating through the cells and water around them.

Ignition Type—The single system consists of one source of current and one set of spark plugs. The dual system consists of a battery and magneto and two sets of plugs, with only one set sparking during motor operation. Two-point ignition requires the use of double-distributer magneto and two sets of plugs. In this case both sets of plugs operate at once.

Spark Advance—Fixed control is one in which the spark is fixed so that it will occur at a given point in the cycle and cannot be changed without removing the magneto and retiming it. On the other hand, the automatic control is one in which the spark automatically advances with motor speed. The hand control is familiar to all, it being the type in which a spark lever is used to vary the time of spark occurrence.

Governor Drive—In motor trucks some form of governor for the engine is employed usually. The tables show the various methods of driving the governor, some using a front wheel drive, others a motor shaft, while some employ the propeller shaft or gearset countershaft.

Motor Speed in R. P. M.—The figures shown in this column refer to that speed of the motor at which the power curve begins to drop off. While the motor may have a greater speed, its power output will not exceed that which it develops at the speed indicated in the tables.

Truck Speed in M. P. H.—This column gives the maximum speed of the truck in

Complete Specifications of 1915 American Commercial Vehicles, In

Name and Model	Load Capacity in Pounds	Price of Chassis	Wheelbase in Inches	TIRES			MOTOR												
				Kind	SIZES IN INCHES		Location	CYLINDERS			S.A.E. H.P.	Cylinders Cast	Valves Placed	COOLING		IGNITION		
					Front	Rear		No.	Bore in Ins.	Stroke in Ins.				Water Circulation	Radiator Type	Type	Make	Spark Advance
A & B, 3-T	6,000	4,500	144	Solid	48x3½d	48x3½d	Under hood	4	5.17	4.75	42.76	Pairs	Right	Gear	Finned	Dual	Bosch	Hand
A & B, 5-T	10,000	4,750	144	Solid	48x3½d	48x5d	Under hood	4	5.17	4.75	42.76	Pairs	Right	Gear	Finned	Dual	Bosch	Hand
Adams, A	2,000	1,850	121*	Solid	36x3½	36x4	Under hood	4	3.75	5.25	22.50	Block	Left	Cent	Finned	Sing	Eisemann	Auto
Adams, D	3,000	2,300	121*	Solid	36x3½	36x3½d	Under hood	4	4.12	5.25	27.20	Block	Left	Cent	Finned	Sing	Eisemann	Auto
Adams, E	4,000	2,500	140*	Solid	36x4	36x4d	Under hood	4	4.12	5.25	27.20	Block	Left	Cent	Finned	Sing	Eisemann	Auto
Aetna, 1½	3,000	2,150	158	Solid	36x3½	36x5	Under hood	4	4.00	4.50	25.60	Pairs	Opp	Cent	Cell	Sing	Eisemann	Auto
Aetna, 2½	5,000	2,400	158	Solid	36x4	36x3½d	Under hood	4	4.37	6.00	34.28	Pairs	Opp	Cent	Cell	Sing	Eisemann	Auto
Armleder, B	2,000	2,200	136	Pneu	40x4	39x5	Under hood	4	4.12	5.25	27.20	Block	Left	Cent	Sq-t	Sing	Bosch	Hand
Armleder, H	3,000	2,150	Opt	Solid	40x4	40x6*	Under hood	4	4.50	5.00	32.40	Block	Opp	Cent	Sq-t	Sing	Bosch	Hand
Armleder, E	4,000	2,500	Opt	Solid	40x4	40x7*	Under hood	4	4.50	5.00	32.40	Block	Opp	Cent	Sq-t	Sing	Bosch	Hand
Atterbury, AW	1,500	1,800	118	Pneu	35x4½	35x4½	Under hood	4	3.50	5.00	19.61	Block	Right	Thermo	Finned	Sing	Bosch	Fixed
Atterbury, BW	2,000	2,100	137	Solid	36x3½	36x5	Under hood	4	3.75	5.25	22.50	Block	Left	Cent	Finned	Sing	Bosch	Fixed
Atterbury, CW	4,000	2,800	153	Solid	36x4	36x4d	Under hood	4	4.12	5.25	27.20	Block	Left	Cent	Finned	Sing	Bosch	Fixed
Atterbury, DW	6,000	3,800	168	Solid	36x5	40x5d	Under hood	4	4.50	5.50	32.40	Pairs	Left	Cent	Finned	Dual-d	Bosch	Hand
Atterbury, E	10,000	4,000	153	Solid	36x5	42x6d	Under hood	4	4.87	5.50	38.25	Pairs	Opp	Cent	Finned	Dual	Bosch	Fixed
Auglaize, H	1,500	950	100	Solid	36x2½	36x3	Under seat	2	5.25	4.00	22.10	Sing	Head	Thermo	Finned	Dual	Remy	Hand
Auglaize, D	1,500	950	100	Solid	36x3½	36x4	Under seat	4	3.75	5.12	22.50	Block	Left	Thermo	Finned	Dual	Remy	Hand
Autocar, 21F	3,000	1,850	97	Opt	34x4	34x5	Under seat	2	3.75	4.50	18.10	Sing	Right	Cent	Finned	Sing	Bosch	Fixed
Available	2,000	.....	Opt	Solid	36x3	36x3½	Under hood	4	3.50	5.00	19.61	Block	Right	Thermo	Finned	Sing	Bosch	Fixed
Available	4,000	.....	Opt	Solid	36x3½	36x6	Under hood	4	4.12	5.25	27.20	Block	Left	Cent	Finned	Sing	Bosch	Fixed
Avery, C	2,000	1,690	128	Solid	34x3½	34x5	Under hood	4	4.12	5.25	27.20	Block	Left	Cent	Finned	Dual	Heinze	Hand
Avery, B	4,000	2,700	128	Solid	36x4	36x3½d	Under floor	4	4.75	5.00	36.15	Sing	Left	Cent	Finned	Dual	Eisemann	Auto
Avery, B	6,000	3,200	128	Solid	38x5	38x4d	Under floor	4	4.75	5.00	36.15	Sing	Left	Cent	Cell	Dual	Eisemann	Auto
Avery, A	6,000	2,500c	140	Wood	38x5	38x4d	Betw. seats	4	4.75	5.00	36.15	Sing	Left	Cent	Finned	Dual	Eisemann	Auto
Avery, B	10,000	4,500	128	Solid	38x6	38x5d	Under floor	4	5.25	5.75	44.20	Pairs	Opp	Cent	Cell	Dual	Eisemann	Auto
B. A. Gramm, 1	2,000	1,750	130	Solid	34x3½	36x4	Under hood	4	3.75	5.25	22.50	Block	Left	Cent	Cell	Sing	Bosch	Hand
B. A. Gramm, 2	4,000	2,550	146	Solid	36x4	36x3½d	Under hood	4	4.25	5.75	29.00	Pairs	Left	Cent	Cell	Dual	Bosch	Hand
B. A. Gramm, 3½	7,000	3,400	158	Solid	36x5	40x5d	Under hood	4	4.25	5.75	29.00	Pairs	Left	Cent	Cell	Dual	Bosch	Hand
B. A. Gramm, 5	10,000	4,300	168	Solid	36x6	40x6d	Under hood	6	4.12	5.50	40.80	Threes	Right	Cent	Cell	Dual	Bosch	Hand
Barker, U	2,000	2,000	130	Solid	42x3½	42x5	Under hood	4	4.00	5.00	25.60	Block	Left	Thermo	Cell	Sing	Eisemann	Auto
Barker, V	4,000	2,400	136	Solid	36x4	36x7	Under hood	4	4.00	5.00	25.60	Block	Left	Thermo	Cell	Sing	Eisenamn	Auto

ABBREVIATIONS: General, *, *with other options;* Opt, *optional.* **Price,** -c, *complete with body.* **Tires, Kind,** Pneu, *pneumatic;* Sol-st, *solid in front, steel in rear;* P&s, *pneumatic in front, solid in rear;* P&c, *pneumatic in front, cushion in rear;* C&s, *cushion in front, solid in rear.* **Tire Sizes,** d, *dual.* **Motor Location,** Betw seats, *between seats.* **Cylinders Cast,** Sing, *singly or individually.* **Location of Valves,** Opp, *opposite, or T-head type;* Top (2-cylinder motors only), *L-head cylinder laid horizontal with valves up;* R&h, *at right and in head, L-head cylinder;* L&h, *at left and in head, L-head cylinder;* 2-cyc, *two-cycle motor, no valves;* Back, *L-head motor placed transversely with valves at rear.* **Water Circulation,** Cent, *centrifugal pump;* Gear, *gear pump;* Thermo, *Thermo-syphon circulation;* Air, *air-cooled, no water.* **Radiator Type,** Finned, *finned-tube;* Cell, *cellular or honey-comb;* Sq-t, *square-tube or flat-tube;* Z-z-t, *zig-zag-tube or crimped flat-tube.* **Ignition, Type,** Sing, *single;* Doub, *double;* Dual-d, *dual-double.* **Make of Magneto** (or other sparking device), Split, *Splitdorf;* Conn, *Connecticut;* King, *Kingston;* West, *Westinghouse;* Day-D, *Dayton-Dick;* Atw-K, *Atwater-Kent.* **Spark Advance,** Auto, *automatic;* **2-Pt,** *two-point fixed, battery circuit fixed in retard, magneto in advance.* **Governor Type,** Cent, *centrifugal;* L-b, *loose-ball;* Suct, *suction;* Hyd, *hydraulic.* **Governor Drive,** Motor, *from motor;* D-shft, *from driving shaft;* F-wheel, *from front wheel;* Gearset, *from gearset countershaft;* Duplex, *from both the motor and the driving shaft, by overrunning clutches.*

Tables of Commercial Car Specifications

miles per hour. The average is rather low because governors are fitted to the majority of the vehicles.

Lubricating Systems—The tables show straight splash, circulating splash, splash-pressure and straight pressure. In the circulating splash the oil is taken by a pump from the crankcase and forced to a distributing channel from which it falls to troughs under the connecting rods. The overflow drops to the crankcase where it is again picked up by the pump. In the non-circulating splash, the oil never is re-circulated. The splash-pressure uses leads to the bearings and also troughs under the rods for splash. The pressure uses no splash, all the feed being by leads to the various parts.

Clutch Type—Dry and wet disk refer to clutches running without and with oil, respectively. Two types of cone clutches are listed, cone and reversed cone. In the former the large diameter of the cone faces the rear of the car while in the reversed cone the large diameter is on the opposite side. This also calls for a reversal of the location of the spring. Those of the expanding and contracting band varieties are bands or shoes that contract or expand against the flywheel.

Gearset Type—In the selective gearset, any speed may be obtained without first going through any other speed. In this type a shift may be made from first directly to high. In the progressive type, on the other hand, in order to obtain third, it is necessary to pass through second. The planetary gearset consists of one big gear with internal teeth having within it and meshing with these teeth one or more small gears. In the planetary type the gears are always in mesh. The friction gearset consists of a driven disk pressing against a driving disk which is attached to a shaft which directly or indirectly revolves the rear wheels. In the individual clutch type of gearset, the gears do not slide but are always in mesh. The countershaft is driven by the master gears in the usual manner, and the direct drive is obtained by a dog clutch. The reduction drives are had by means of individual dog clutches secured to the driven shaft and which engage with corresponding clutch members on the sides of the driven gears, loosely mounted on the driven shaft. Elec means the truck is electrically operated.

Gearset Location—Unit-m refers to a unit power plant with the motor, clutch and gearset formed as a unit. Unit-j means unit with the jacketshaft at the shaft which is used in double-chain drive cars to operate the side chains. Unit with the rear axle is expressed as unit-x and in this the rear axle incorporates the gearset.

Total Gear Ratio—This means the ratio between the motor speed and wheel speed when the car is traveling in high gear. Thus, 10 to 1 means that when the car is in high

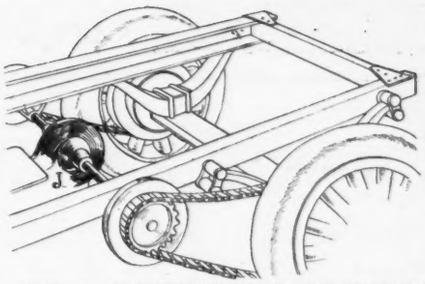


FIG. 2—ILLUSTRATING SIDE-CHAIN DRIVE.

the motor turns over ten times faster than the rear wheels.

Final Drive—In the bevel drive the power is transmitted from the propeller shaft through bevel gears to the rear axle. Worm drive means that a worm gear is used instead of a bevel. In the worm drive the worm may be placed above or below the wheel, as shown in Fig. 1. The internal gear drive means that the wheels are fitted with gears with internal teeth driven by gears on the ends of shafts parallel to the dead axles.

The chain drive, Fig. 2, consists of chains from a jackshaft J turning the wheels.

In the illustration the drive is known as a double-chain because two chains, one at either end of the jackshaft, drive the rear wheels. There is another type known as the single-chain drive in which one chain is directly connected to a gear on the rear axle.

Including Capacity, Motor Speed, Final Drive, Horsepower, Etc.

MOTOR						TRANSMISSION							SPRINGS		CONTROL			
GOVERNOR		SPEEDS		Carburetor Make	Lubrication	Clutch Type	GEARSET			Total Gear-Ratio in High	Final Drive	Torque Taken By	Front	Rear	Steer	Levers	Propulsion Taken By	Name and Model
Type	Drive	Motor in R.p.m.	Truck in M.p.h.				Type	Location	Speeds									
.....	.....	.....	.....	Scheb	Circ-spl	.....	Elec	Amid	2	28 -1	Int-gear-f.	R-r	½-Ell	½-Ell	Right	Right	R-r	A & B, 3-T
.....	.....	.....	.....	Scheb	Circ-spl	.....	Elec	Amid	2	28 -1	Int-gear-f.	R-r	½-Ell	½-Ell	Right	Right	R-r	A & B, 5-T
Cent	Motor	1,300	15	Zenith	Circ-spl	Dry-d	Selec	Unit-j	3	7½-1	Dbl chn	.....	½-Ell	½-Ell	Left	Cent	R-r	Adams, A
Cent	Motor	1,200	13	Zenith	Circ-spl	Dry-d	Selec	Unit-j	3	7½-1	Dbl chn	.....	½-Ell	½-Ell	Left	Cent	R-r	Adams, D
Cent	Motor	1,100	12	Zenith	Circ-spl	Dry-d	Selec	Unit-j	3	7½-1	Dbl chn	.....	½-Ell	½-Ell	Left	Cent	R-r	Adams, E
Cent	D-shft	1,000	15	Scheb	Spl-press	Dry-d	Selec	Unit-m	3	8 -1	Top worm	Springs	½-Ell	¾-Ell	Left	Cent	Springs	Aetna, 1½
Cent	Motor	1,000	14	Scheb	Spl-press	Dry-d	Selec	Unit-m	3	7 -1	Top worm	Springs	½-Ell	¾-Ell	Left	Cent	Springs	Aetna, 2½
.....	.....	1,300	20	Scheb	Circ-spl	Dry-d	Selec	Unit-m	3	5½-1	Bevel	T-arm	½-Ell	Ellip	Left	Cent	R-r	Armleder, B
.....	.....	1,300	16	Scheb	Splash	Wet-d	Selec	Unit-j	3	8 -1	Dbl chn	.....	½-Ell	½-Ell	Left	Cent	R-r	Armleder, H
.....	.....	1,300	16	Scheb	Splash	Wet-d	Selec	Unit-j	3	8½-1	Dbl chn	.....	½-Ell	½-Ell	Left	Cent	R-r	Armleder, E
.....	.....	1,200	22½	Strom	Circ-spl	Dry-d	Selec	Unit-m	3	6 -1	Top worm	Springs	½-Ell	½-Ell	Left	Cent	Springs	Atterbury, AW
Cent	Motor	1,200	18¾	Strom	Circ-spl	Dry-d	Selec	Unit-m	3	6¾-1	Top worm	Springs	½-Ell	½-Ell	Left	Cent	Springs	Atterbury, BW
Cent	Motor	1,200	14	Strom	Circ-spl	Dry-d	Selec	Unit-m	3	9½-1	Top worm	Springs	½-Ell	½-Ell	Left	Cent	Springs	Atterbury, CW
Cent	Motor	1,200	12	Strom	Circ-spl	Dry-d	Selec	Unit-m	3	10½-1	Top worm	.....	½-Ell	½-Ell	Left	Cent	R-r	Atterbury, DW
Cent	Motor	1,200	10	Strom	Circ-spl	Wet-d	Selec	Unit-j	3	12 -1	Dbl chn	.....	½-Ell	½-Ell	Right	Right	R-r	Atterbury, E
L-b	D-shft	1,200	12	Scheb	Circ-spl	Wet-d	Selec	Unit-j	2	8- 1	Bevel	R-r	½-Ell	½-Ell	Right	Right	R-r	Auglaize, H
L-b	D-shft	1,000	18	Scheb	Circ-spl	Wet-d	Selec	Unit-j	3	7 -1	Bevel	R-r	½-Ell	½-Ell	Right	Right	R-r	Auglaize, D
None	None	.....	20	Strom	Spl-press	Dry-p	Prog	Amid	3	7 -1	Dbl-red	Springs	½-Ell	Plat	Right	Right	Springs	Autocar, 21F
Cent	Motor	1,000	16	Ray	Circ-spl	Dry-d	Selec	Unit-m	3	6½-1	Top worm	Springs	½-Ell	½-Ell	Left	Cent	Springs	Available.
Cent	Motor	1,000	14	Ray	Circ-spl	Dry-d	Selec	Unit-m	3	7¼-1	Top worm	Springs	½-Ell	½-Ell	Left	Cent	Springs	Available
Cent	Motor	1,200	15	Ray	Spl-press	Dry-d	Selec	Unit-m	3	7¾-1	Dbl chn	.....	½-Ell	½-Ell	Left	Cent	R-r	Avery, C
L-b	Motor	1,200	14½	Ray	Spl-press	Dry-d	Selec	Unit-j	3	3½-1	Dbl chn	.....	½-Ell	½-Ell	Right	Cent	R-r	Avery, B
Cent	Motor	1,200	13	Ray	Spl-press	Dry-p	Selec	Unit-j	3	3½-1	Dbl chn	.....	½-Ell	½-Ell	Right	Cent	R-r	Avery, B
Cent	Motor	1,200	12	Ray	Spl-press	Dry-d	Selec	Unit-j	3	3½-1	Dbl chn	.....	½-Ell	½-Ell	Right	Cent	R-r	Avery, A
Cent	Motor	1,000	10	Scheb	Spl-press	Wet-d	Selec	Unit-j	3	12½-1	Dbl chn	.....	½-Ell	½-Ell	Right	Cent	R-r	Avery, B
Cent	Motor	1,000	16	Scheb	Spl-press	Cone	Selec	Unit-j	3	7 -1	Dbl chn	.....	½-Ell	½-Ell	Left	Cent	R-r	B. A. Gramm, 1
Cent	Motor	1,000	15	Strom	Spl-press	Dry-d	Ind-c	Amid	3	8½-1	Top worm	Springs	½-Ell	½-Ell	Left	Cent	Springs	B. A. Gramm, 2
Cent	Motor	1,100	12	Strom	Spl-press	Dry-d	Ind-c	Amid	4	9½-1	Top worm	Springs	½-Ell	½-Ell	Left	Cent	Springs	B. A. Gramm, 3½
Cent	Motor	1,000	10	Strom	Spl-press	Dry-d	Ind-c	Amid	4	11 -1	Dbl chn	.....	½-Ell	½-Ell	Left	Cent	R-r	B. A. Gramm, 5
None	None	1,500	27	Strom	Spl-press	Dry-p	Selec	Unit-m	4	.....	Top worm	Springs	½-Ell	½-Ell	Left	Cent	Springs	Barker, U
None	None	1,500	20	Strom	Spl-press	Dry-p	Selec	Unit-m	4	.....	Top worm	Springs	½-Ell	½-Ell	Left	Cent	Springs	Barker, V

Carbureter Make, Strom, *Stromberg;* Scheb, *Schebler;* Ray, *Rayfield;* Excel, *Excelsior;* King, *Kingston;* B-Z, *Breeze-Zephyr.* **Lubrication,** Splash, *non-circulating or simple splash;* Circ-spl, *circulating-splash;* Spl-press, *splash-pressure;* Fuel-inj, *fuel injection, oil mixed with fuel;* Pressure, *pressure feed, no splash.* **Clutch Type,** Dry-p, *dry plate;* Dry-d, *dry multiple disk;* Wet-d, *wet disk or disk-in-oil;* R-cone, *reversed cone or inverted cone;* Exp-s, *expanding shoe;* Cont-b, *contracting band.* **Gearset Type,** Prog, *progressive sliding gear;* Selec, *selective sliding gear;* Plan, *planetary;* Ind-c, *constant-mesh individual-clutch;* Fric, *friction;* Hyd, *hydraulic;* Elec, *electric.* **Gearset Location,** Amid, *amidships;* Unit-m, *unit with motor;* Unit-j, *unit with jackshaft;* Unit-x, *unit with axle;* Unit-s, *unit driveshaft.* **Final Drive,** Bevel, *direct bevel;* Doub-r, *double-reduction bevel and spur;* Int-g, *internal gear;* Top worm, *worm gear with worm on top;* Dbl chn, *double chain;* Sing chn, *single chain;* -f, *to front wheels;* -4, *to all four wheels.* **Driving Torque,** R-r, *radius rods;* T-arm, *torque-arm;* Tor-t, *torsion tube;* Sub-f, *sub-frame.* **Springs,** Ellip, *elliptic;* ½-Ell, *half-elliptic;* ¼-Ell, *quarter-elliptic;* ¾-Ell, *three-quarters-elliptic;* Plat, *platform;* T-ell, *transverse elliptic;* Cant, *cantilever;* **Comb,** *combination of half-elliptic and elliptic on double frames.* **Steering,** Cent, *center.* **Levers,** Cent, *center;* C&r, *gearshift center, brake right;* C&l, *gearshift center, brake left;* St-col, *steering column.* **Propulsion,** R-r, *radius rods;* T-arm, *torque arm;* Tor-t, *torsion tube;* Sub-f, *sub-frame.*

Complete Specifications of 1915 American Commercial Vehicles

Name and Model	Load Capacity in Pounds	Price of Chassis	Wheelbase in Inches	TIRES			MOTOR												
				Kind	SIZES IN INCHES		Location	CYLINDERS			S.A.E. H.P.	Cylinders Cast	Valves Placed	COOLING		IGNITION		
					Front	Rear		No.	Bore in Ins.	Stroke in Ins.				Water Circulation	Radiator Type	Type	Make	Spark Advance
Bauer, A	1,000	900	100	Solid	36x2	36x2	Under hood	4	3.75	5.00	22.50	Block	Right	Cent	Finned	Sing	Mea	Hand
Bauer, B	1,500	1,150	110	Solid	34x3	34x3½	Under hood	4	3.75	5.00	22.50	Block	Right	Cent	Finned	Sing	Mea	Hand
Beck	3,000	1,600	130	Solid	34x3½	38x4	Under hood	4	4.12	5.25	27.20	Pairs	R&H	Gear	Sq-t	Dual	Bosch	Hand
Beck	5,000	1,850	130	Solid	36x5	36x6	Under hood	4	5.00	6.00	40.00	Pairs	Opp	Gear	Sq-t	Dual	Bosch	Hand
Bessemer, C	2,000	1,250	108	Solid	34x3½	34x4	Under hood	4	3.50	5.00	19.61	Block	Right	Thermo	Finned	Sing	Eisemann	Hand
Bessemer, A	3,000	1,800	136	Solid	34x4	34x5	Under hood	4	4.12	5.25	27.20	Block	Left	Thermo	Finned	Sing	Eisemann	Hand
Bessemer, D	4,000	2,300	136	Solid	36x4	36x3½d	Under hood	4	4.12	5.25	27.20	Block	Left	Thermo	Finned	Sing	Eisemann	Hand
Best, A	1,200	750	78	Solid*	32x2*	34x2½*	Under floor	2	4.50	4.50	16.20	Sing	Opp	Thermo	Finned	Dual	Remy	Auto
Blair, C-1	4,000	2,850	114*	Solid	34x4	34x3½d	Betw. seats	4	4.12	5.25	27.20	Block	Left	Cent	Sq-t	Sing	Bosch	Fixed
Blair, D-1	6,000	3,250	120*	Solid	36x4	36x4d	Betw. seats	4	4.75	5.50	36.15	Pairs	Right	Cent	Sq-t	Dual	Bosch	Fixed
Blair, E-1	8,000	3,750	135*	Solid	36x5	36x5d	Betw. seats	4	4.75	5.50	36.15	Pairs	Right	Cent	Sq-t	Dual	Bosch	Fixed
Blair, F	10,000	4,500	135*	Solid	36x6	36x6d	Betw. seats	4	4.75	5.50	36.15	Pairs	Right	Cent	Sq-t	Dual	Bosch	Fixed
Brasie, Packet	600	375	100	Pneu	28x3	28x3	Under hood	4	2.50	4.00	10.00	Block	Right	Thermo	Cell	Sing	Berling	Hand
Brasie, Twin City	4,000	1,350	104	Solid	34x3	36x3½	Under seat	2	5.00	5.00	20.00	Sing	Top	Thermo	Cell	Sing	K.W	Hand
Brasie, Twin City	4,000	1,350	104	Solid	34x3	36x3½	Under floor	4	3.75	4.50	22.50	Pairs	Right	Thermo	Cell	Sing	K.W	Hand
Brockway, G	1,500	1,205	100	Solid	36x2½	36x3	Under hood	4	3.50	5.00	19.61	Block	Left	Thermo	Finned	Sing	Bosch	Fixed
Brockway, H	2,500	1,590	112*	Solid	36x3	36x4	Under hood	4	3.75	5.25	22.50	Block	Left	Cent	Finned	Sing	Bosch	Fixed
Brockway, I	4,000	1,875	120*	Solid	36x4	36x3½d	Under hood	4	4.12	5.25	27.20	Block	Left	Cent	Finned	Sing	Bosch	Fixed
Buick, C4	1,500	1,150	122	Pneu	35x5	35x5	Under hood	4	3.75	5.00	22.50	Pairs	Head	Cent	Finned	Dual	Delco	Hand
Bulley Tractor		3,400	72	Solid	34x4	38x4d	Under hood	4	4.37	5.50	30.65	Pairs	Right	Cent	Finned	Dual	Remy	Hand
Chase, S	1,000	750	98	Solid	36x2	36x2	Under hood	3	4.12	4.00	2-cycl.	Sing	2-cy	Air		Sing	Bosch	Fixed
Chase, T	1,500	1,500	135	Solid	36x2½	36x3½	Under hood	4	3.50	5.00	19.61	Block	Right	Cent	Finned	Sing	Bosch	Fixed
Chase, R	3,000	2,200	146*	Solid	36x3½	36x5	Under hood	4	3.75	5.25	22.50	Block	Left	Cent	Finned	Sing	Bosch	Fixed
Chase, O	6,000	3,300	175	Solid	36x5	36x5d	Under hood	4	4.50	5.50	32.40	Pairs	Left	Cent	Finned	Sing	Bosch	Fixed
Coleman, D	2,000	1,950	112	Solid	36x3½	36x4	Under seat	4	3.75	5.25	22.50	Block	Left	Cent	Z-z-t	Sing	Bosch	Hand
Coleman, G	4,000	2,450	124	Solid	36x4	36x3½d	Under seat	4	3.75	5.25	22.50	Block	Left	Cent	Z-z-t	Sing	Bosch	Hand
Coleman, H	6,000	3,000	134	Solid	36x5	36x5d	Under seat	4	4.12	5.50	27.20	Pairs	Right	Cent	Z-z-t	Sing	Bosch	Hand
Commerce, S	1,500	875	107	Pneu	33x4	33x4	Under hood	4	3.50	5.00	19.61	Block	R&H	Thermo	Finned	Sing	Eisemann	Fixed
Continental, F	3,000	1,700	144	Solid	36x3½	36x4	Under hood	4	3.25	4.25	16.92	Block	Left	Cent	Cell	Dual	Bosch	Hand
Continental, G	6,000	2,700	144	Solid	36x3½	36x4	Under hood	4	3.25	4.25	16.92	Block	Left	Cent	Cell	Dual	Bosch	Hand
Corbitt, F	2,500	2,000	130	Solid	36x3½	40x4	Under hood	4	3.75	5.25	22.50	Block	Left	Cent	Cell	Sing	Bosch	Hand
Couple-Gear, HC	7,000	4,850	144	Solid	36x4d	36x4d	Under floor	4	5.25	6.00	44.20	Sing	Opp	Cent	Sq-t	Dual	Mea	2-pt
Couple-Gear, AC	10,000	5,400	144	Solid	36x5d	36x5d	Under floor	4	5.75	6.00	53.00	Sing	Opp	Cent	Sq-t	Dual	Mea	2-pt
Crawford	6,000	3,000	144	Solid	37x4	37x4d	Under hood	4	4.50	5.50	32.40	Pairs	Left	Cent	Cell	Dual	Bosch	Hand
Crown, A	1,500	2,000	120	Pneu	34x4	34x4½	Under hood	4	3.75	5.00	22.50	Block	Right	Cent	Finned	Sing	Bosch	Fixed
Crown, B	3,000	2,500	140	Solid	34x3½	36x5	Under hood	4	4.00	5.00	25.60	Block	Right	Cent	Finned	Sing	Bosch	Fixed
Crown, C	5,000	3,000	150	Solid	34x4	36x6	Under hood	4	4.25	5.00	29.00	Pairs	Opp	Cent	Finned	Sing	Bosch	Hand
Curtis	4,000	2,750	130	Solid	36x4	36x3½d	Under floor	4	4.12	5.25	27.20	Block	Right	Thermo	Finned	Sing	Eisemann	Auto
Curtis	6,000	3,250	130	Solid	36x4	36x4d	Under floor	4	4.12	5.25	27.20	Block	Right	Thermo	Finned	Sing	Eisemann	Auto
Daimler, Amer., FV	12,000		169½	Solid	34x5	40x6d	Under hood	4	4.25	5.90	29.00	Pairs	Head	Cent	Cell	Sing	Bosch	Fixed
Dart, A	1,000	845	100	Pneu	32x3½	32x3½	Under hood	4	3.62	4.00	34.28	Block	Head	Thermo	Cell	Dual	Briggs	Hand
Dart, B	2,000	1,400	114	Solid	37x3	37x3½	Under hood	4	3.50	5.00	19.61	Block	Right	Thermo	Cell	Sing	Eisemann	Fixed
Dart, C	4,000	1,800	130*	Solid	35x4	39x4	Under hood	4	4.12	5.50	27.20	Block	Right	Cent	Cell	Sing	Eisemann	Fixed
Dayton, U	2,000	1,800	118½	Solid	36x4	36x3d	Under floor	4	4.25	5.00	29.00	Pairs	Opp	Gear	Finned	Dual	Bosch	Hand
Dayton, A	8,000	2,700	136	Solid	36x5	36x4d	Under floor	4	4.75	5.50	36.15	Pairs	Opp	Gear	Finned	Dual	Bosch	Hand
Decatur, VI	800	630	102	Pneu	30x3½	30x3½	Under body	4	2.75	4.00	12.08	Block	Right	Gear	Finned	Sing	Berling	Fixed
Decatur, C	2,000	1,500	113*	Solid*	34x3½*	34x4*	Under hood	4	3.75	5.25	22.50	Block	Left	Cent	Cell	Sing	Bosch	Fixed
DeKalb, D1	3,000	1,950	134	Solid	34x3½	36x5	Under hood	4	4.12	5.25	27.20	Block	Left	Cent	Finned	Sing	Eisemann	Hand
DeKalb, D2	5,000	2,450	136	Solid	36x4	38x6	Under hood	4	4.12	5.25	27.50	Block	Left	Cent	Finned	Sing	Eisemann	Fixed
Denby, A	1,500	1,500	120	Solid	34x3	34x4	Under hood	4	3.50	5.00	19.61	Block	Right	Thermo	Finned	Sing	Eisemann	Fixed
Denby, B	2,000	1,600	120	Solid	34x3½	34x5	Under hood	4	3.50	5.00	19.61	Block	Right	Thermo	Finned	Sing	Eisemann	Fixed
Dorris, IA4	1,500	1,950	132*	Pneu	36x4½	36x4½	Under hood	4	4.37	5.00	30.65	Pairs	Head	Cent	Cell	Dual	Bosch	Hand
Dorris, IA4	4,000	2,500	144*	Solid	36x3½	36x3½d	Under hood	4	4.37	5.00	30.65	Pairs	Head	Cent	Finned	Dual	Bosch	Hand
Duplex, C	4,000	2,800	130	Solid	35x4	35x4	Under hood	4	4.12	5.50	27.20	Block	Right	Cent	Finned	Sing	Eisemann	Auto
Duplex, D	6,000	3,200	130	Solid	35x5	35x5	Under hood	4	4.25	5.50	29.00	Block	Right	Cent	Finned	Sing	Eisemann	Auto
Fargo, E	1,500	750	100	Solid	34x2½	34x3	Under body	2	4.50	6.00	16.20	Sing	Head	Thermo	Z-z-t	Dual	Briggs	Hand
Fargo, F	2,000	1,250	130	Solid	36x3	36x3½	Under hood	4	3.75	5.00	22.50	Block	Right	Thermo	Finned	Dual	Bosch	Hand
Federal, GH	3,000	1,800	120*	Solid	36x3½	36x5	Under hood	4	4.12	5.25	27.20	Block	Left	Cent	Cell	Sing	Eisemann	Fixed
Federal, GW-HW	3,000	1,900	120*	Solid	36x3½	36x5	Under hood	4	4.12	5.25	27.20	Block	Left	Cent	Cell	Sing	Eisemann	Fixed
Flint, C	2,000	1,285*	106	Solid*	34x3*	35x3½*	Under hood	4	3.75	4.50	22.50	Block	R&H	Thermo	Finned	Dual	Remy	Hand
Forschler, 1A	3,000	2,300	124*	Solid	36x3½	36x3d	Under hood	4	4.12	5.25	27.20	Block	Left	Cent	Sq-t	Dual	Bosch	Hand
Four Wheel Drive, G	4,000	3,400	124	Solid	36x4	36x4	Under seat	4	4.25	5.00	29.00	Pairs	Opp	Cent	Sq-t	Sing	Bosch	Hand
Four Wheel Drive, B	6,000	4,000	124	Solid	36x6	36x6	Under seat	4	4.75	5.50	36.15	Pairs	Opp	Cent	Sq-t	Sing	Bosch	Hand
Four Wheel Drive, M	12,000	4,800	148	Solid	38x5d	38x5d	Under seat	4	5.25	7.00	44.20	Pairs	Opp	Cent	Sq-t	Dual	Bosch	Hand
Fremont-Mais, O	4,000	1,700*	132*	Solid	36x3½	36x5	Under hood	4	3.75	5.50	22.50	Block	Right	Cent	Finned	Sing	Eisemann	Fixed

ABBREVIATIONS: General, *, *with other options;* Opt, *optional.* **Price,** -c, *complete with body.* **Tires, Kind,** Pneu, *pneumatic;* Sol-st, *solid in front, steel in rear;* P&s, *pneumatic in front, solid in rear;* P&c, *pneumatic in front, cushion in rear;* C&s, *cushion in front, solid in rear.* **Tire Sizes,** d, *dual.* **Motor Location,** Betw seats, *between seats.* **Cylinder Cast,** Sing, *singly or individually.* **Location of Valves,** Opp, *opposite, or T-head type;* Top (2-cylinder motors only) *L-head cylinder laid horizontal with valves up;* R&h, *at right and in head, L-head cylinder;* L&h, *at left and in head, L-head cylinder;* 2-cyc, *two-cycle motor, no valves;* Back, *L-head motor placed transversely with valves at rear.* **Water Circulation,** Cent, *centrifugal pump;* Gear, *gear pump;* Thermo, *thermo-syphon circulation;* Air, *air-cooled, no water.* **Radiator Type,** Finned, *finned-tube;* Cell, *cellular or honeycomb;* Sq-t, *square-tube or flat-tube;* Z-z-t, *zig-zag-tube or crimped flat-tube.* **Ignition, Type,** Sing, *single;* Doub, *double;* Dual-d, *dual-double.* **Make of Magneto** (or other sparking device), Split, *Splitdorf;* Conn, *Connecticut;* King, *Kingston;* West, *Westinghouse;* Day-D, *Dayton-Dick;* Atw-K, *Atwater-Kent.* **Spark Advance,** Auto, *automatic;* 2-pt, *two-point fixed, battery circuit fixed in retard, magneto in advance.* **Governor Type,** Cent, *centrifugal;* L-b, *loose-ball;* Suct, *suction;* Hyd, *hydraulic.* **Governor Drive,** Motor, *from motor;* D-shft, *from driving shaft;* F-wheel, *from front wheel;* Gearset, *from gearset countershaft;* Duplex, *from both the motor and the driving shaft, by overrunning clutches.*

Including Capacity, Motor Speed, Final Drive, Horsepower, Etc.

MOTOR						TRANSMISSION						SPRINGS		CONTROL			
GOVERNOR		SPEEDS		Carbureter Make	Lubrication	Clutch Type	GEARSET			Total Gear-Ratio in High	Final Drive	Torque Taken By	Front	Rear	Steer	Levers	Propulsion Taken By	Name and Model
Type	Drive	Motor in R.p.m.	Truck in M.p.h.				Type	Location	Speeds									
None	None	1,500	25	Scheb	Spl-press	Wet-d	Selec	Unit-m	3	6 -1	Dbl-red	T-arm	½-Ell	Ellip	Left	Cent	R-r	Bauer, A
None	None	1,500	23	Scheb	Spl-press	Wet-d	Selec	Unit-m	3	6 -1	Dbl-red	T-arm	½-Ell	Ellip	Left	Cent	R-r	Bauer, B
Hyd	Motor		16	Strom	Splash	Wet-d	Selec	Unit-m	3		Int-gear	Springs	½-Ell	½-Ell	Left	Cent		Beck
Hyd	Motor		12	Strom	Splash	Wet-d	Selec	Unit-m	3		Int-gear		½-Ell	½-Ell	Left	Cent		Beck
None	None			Ray	Spl-press	Cone	Selec	Unit-j	3	6½-1	Dbl chn		½-Ell	½-Ell	Left	Cent	R-r	Bessemer, C
None	None			Ray	Spl-press	Cone	Selec	Unit-j	3	7½-1	Dbl chn		½-Ell	Plat	Left	Cent	R-r	Bessemer, A
Cent	Motor	1,000	14	Ray	Spl-press	Cone	Selec	Amid	3	7½-1	Top worm	Springs	½-Ell	½-Ell	Left	Cent	Springs	Bessemer, D
Cent	Motor	800	18	Marvel	Splash	None	Fric	Unit-j	Any	6 -1	Dbl chn		½-Ell	Ellip	Left	St-col	R-r	Best, A
Cent	Motor	1,100	15	S.U	Spl-press	Cone	Ind-c	Amid	3	7½-1	Top worm	Sub-f	½-Ell	½-Ell	Right	Right	R-r	Blair, C1
Cent	Motor	1,000	14	S.U	Spl-press	Cone	Ind-c	Amid	3	8½-1	Top worm	Sub-f	½-Ell	½-Ell	Right	Right	R-r	Blair, D1
Cent	Motor	1,000	13	S.U	Spl-press	Cone	Ind-c	Amid	3	9½-1	Top worm	Sub-f	½-Ell	½-Ell	Right	Right	R-r	Blair, E1
Cent	Motor	1,200	12	S.U	Spl-press	Cone	Ind-c	Amid	3	12 -1	Top worm	Sub-f	½-Ell	½-Ell	Right	Right	R-r	Blair, F
				Mayer	Circ-spl	None	Fric	Unit-j	Any		Dbl chn		½-Ell	½-Ell	Left	Left	R-r	Brasie, Packet
				Scheb	Spl-press	Wet-d	Plan	Unit-j	2		Dbl chn		½-Ell	½-Ell	Right		R-r	Brasie, Twin City
				Scheb	Spl-press	Wet-d	Selec	Unit-j	3		Dbl chn		½-Ell	½-Ell	Right		R-r	Brasie, Twin City
Cent	Motor	1,500	18	Scheb	Circ-spl	Cone	Selec	Unit-j	3	7 -1	Dbl chn		Ellip	Ellip	Left	Cent	R-r	Brockway, G
Cent	Motor	1,200	15	Scheb	Circ-spl	Cone	Selec	Unit-j	3	8½-1	Dbl chn		½-Ell	Plat	Left	Cent	R-r	Brockway, H
Cent	Motor	1,200	15	Scheb	Circ-spl	Cone	Selec	Unit-j	3	8½-1	Dbl chn		½-Ell	Plat	Left	Cent	R-r	Brockway, I
Cent	Motor	1,800	25	Marvel	Circ-spl	Cone	Selec	Unit-x	3	6 -1	Bevel	T-arm	½-Ell	Ellip	Left	Cent	T-arm	Buick, C-4
Cent	Motor	800	12	Strom	Circ-spl	Dry-p	Selec	Unit-j	3	14 -1	Dbl chn		½-Ell	½-Ell	Right	Right	R-r	Bulley Tractor
None	None	750	15	Holley	Fuel-inj	Wet-d	Plan	Amid	2	7½-1	Dbl chn		Ellip	½-Ell	Left	Cent	R-r	Chase, S
Cent	Motor	1,200	22	Holley	Spl-press	Dry-p	Selec	Unit-m	3	6½-1	Top worm	Springs	½-Ell	½-Ell	Left	Cent	Springs	Chase, T
Cent	Motor	1,200	18	Holley	Spl-press	Dry-p	Selec	Unit-m	3	7½-1	Top worm	Springs	½-Ell	½-Ell	Right	Cent	Springs	Chase, R
Cent	Motor	1,200	18	Holley	Spl-press	Dry-p	Selec	Unit-m	4	5½-1	Top worm	Springs	½-Ell	½-Ell	Right	Cent	Springs	Chase, O
Suct	Motor	1,000	16	Scheb	Spl-press	Cone	Selec	Unit-j	3	6½-1	Dbl chn		Ellip	Ellip	Right	Right	R-r	Coleman, D
Suct	Motor	1,000	14	Scheb	Spl-press	Cone	Selec	Unit-j	3	9 -1	Dbl chn		Ellip	Plat	Right	Right	R-r	Coleman, G
Suct	Motor	1,000	12	Scheb	Spl-press	Cone	Selec	Unit-j	3	9½-1	Dbl chn		Ellip	Plat	Right	Right	R-r	Coleman, H
		2,000	25	Holley	Circ-spl	Cone	Selec	Unit-m	3	6 -1	Bevel	Tor-t	½-Ell	½-Ell	Left*	Cent	Springs	Commerce, S
Cent	Motor	1,200		Strom	Circ-spl	Cone	Selec		3		Opt		½-Ell	½-Ell	Right	Right	R-r	Continental, F
Cent	Motor	1,200		Strom	Circ-spl	Cone	Selec		3		Opt		½-Ell	½-Ell	Right	Right	R-r	Continental, G
Cent	Motor	1,100	16	Strom	Circ-spl	Wet-d	Selec	Unit-j	3	6½-1	Dbl chn		½-Ell	½-Ell	Left	Cent	R-r	Corbitt, F
Cent	Motor	1,200	15	Strom	Circ-spl	None	Elec	Unit-m	5	25 -1	Bevel-4	Springs	½-Ell	½-Ell	Right	Cent	R-r	Couple-Gear, HC
Cent	Motor	1,000	12	Strom	Circ-spl	None	Elec	Unit-m	5	25 -1	Bevel-4	Springs	½-Ell	½-Ell	Right	Cent	R-r	Couple-Gear, AC
Suct	Motor	2,000	15	Strom	Circ-spl	Cone	Selec	Amid	3		Dbl chn		½-Ell	½-Ell	Right		R-r	Crawford
Cent	Motor	1,050	20	Strom	Splash	Cone	Selec	Amid	4		Top worm	Springs	½-Ell	½-Ell	Left	Cent	Springs	Crown, A
Cent	Motor	1,050	15	Strom	Circ-spl	Cone	Selec	Amid	4		Top worm	Springs	½-Ell	½-Ell	Left	Cent	Springs	Crown, B
Cent	Motor	1,050	12	Strom	Circ-spl	Cone	Selec	Amid	4		Top worm	Springs	½-Ell	½-Ell	Left	Cent	Springs	Crown, C
Cent	Motor	1,500		Excel	Spl-press	Cone	Selec	Amid	3		Dbl chn		½-Ell	½-Ell	Right	Right	R-r	Curtis
Cent	Motor	1,500		Excel	Spl-press	Cone	Selec	Amid	3		Dbl chn		½-Ell	½-Ell	Right	Right	R-r	Curtis
Cent	Motor	850	10	Daimler	Spl-press	R-cone	Selec	Amid	4	9½- 1	Int-gear	T-arm	½-Ell	½-Ell	Right	Right	R-r	Daimler, Amer., FV
None	None	1,400	23	Strom	Splash	Cone	Selec	Unit-x	3	6 -1	Bevel	Tor-t	½-Ell	½-Ell	Left	Cent	Tor-t	Dart, A
None	None	1,200	20	Strom	Splash	Dry-d	Selec	Unit-m	3	Opt	Dbl chn		½-Ell	½-Ell	Left	Cent	R-r	Dart, B
None	None	1,100	15	Strom	Splash	Cone	Selec	Unit-j	3	8½-1	Dbl chn		½-Ell	½-Ell	Left	Cent	R-r	Dart, C
			16	Opt	Circ-spl	Wet-d	Selec	Unit-j	3	9½-1	Dbl chn		½-Ell	Plat	Left	Cent	R-r	Dayton, U
			12	Opt	Circ-spl	Wet-d	Selec	Unit-j	3	9½-1	Dbl chn		½-Ell	Plat	Left	Cent	R-r	Dayton, A
None	None		30	Zephyr	Circ-spl	Cone	Selec	Unit-x	3	5½-1	Sing chn		½-Ell	T-Ell	Left	Cent	R-r	Decatur, VI
None	None	2,000	25	Ray	Circ-spl	Dry-d	Selec	Unit-m	3	7½-1	Int-gear	Springs	½-Ell	½-Ell	Right	Cent	Springs	Decatur, C
Cent	Motor	888	14	Strom	Spl-press	Cone	Selec	Unit-j	3	6½-1	Dbl chn		½-Ell	½-Ell	Left	Cent	R-r	DeKalb, D1
Cent	Motor	750	12	Strom	Spl-press	Cone	Selec	Unit-j	3	8½-1	Dbl chn		½-Ell	½-Ell	Left	Cent	R-r	DeKalb, D2
Cent	Motor	1,317	18	Strom	Spl-press	Dry-d	Selec	Unit-m	3	7½-1	Int-gear	Springs	½-Ell	½-Ell	Left	Cent	Springs	Denby, A
Cent	Motor	1,317	18	Strom	Circ-spl	Dry-d	Selec	Unit-m	3	7½-1	Int-gear	Springs	½-Ell	½-Ell	Left	Cent	Springs	Denby, B
Suct	Motor	1,375	25	Strom	Circ-spl	Dry-d	Selec	Unit-m	3	4 -1	Bevel	T-arm	½-Ell	Plat	Left	Cent	Springs	Dorris, 1A4
Suct	Motor	946	15	Strom	Circ-spl	Dry-d	Selec	Unit-m	3	6½-1	Dbl chn		½-Ell	½-Ell	Left	Cent	R-r	Dorris, 1A4
Cent	Duplex	1,400	12	Scheb	Circ-spl	Wet-d	Selec	Unit-m	3	8 -1	Int-gear-4	Springs	½-Ell	½-Ell	Left	Cent	Springs	Duplex, C
Cent	Dulpex	1,400	12	Scheb	Circ-spl	Wet-d	Selec	Unit-m	3	8 -1	Int-gear-4	Springs	½-Ell	½-Ell	Left	Cent	Springs	Duplex, D
None	None	1,000	20	Scheb	Splash	None	Fric	Amid	Any	4 -1	Bevel	T-arm	½-Ell	Plat	Left	Cent	Springs	Fargo, E
			18	Ray	Circ-spl	Cone	Selec	Unit-m	3	6 -1	Doub-r	T-arm	½-Ell	½-Ell	Left	Cent	Springs	Fargo, F
Cent	Motor	1,120	15	Strom	Circ-spl	Cone	Selec	Unit-j	3	8 -1	Dbl chn		½-Ell	½-Ell	Left	Cent	R-r	Federal, GH
Cent	Motor	1,190	15	Strom	Circ-spl	Cone	Selec	Amid	3	8½-1	Top worm	Springs	½-Ell	½-Ell	Left	Cent	R-r	Federal, GW&HW
Cent	Motor	1,100	20	Marvel	Circ-spl	Cone	Selec	Amid	3	7 -1	Doub-r	T-arm	½-Ell	½-Ell	Left	Cent	T-arm	Flint, C
Cent	Motor	1,200	15	Carter	Spl-press	Cone	Selec	Unit-j	3		Dbl chn		Comb	Comb	Left	Cent	R-r	Forschler, 1A
Cent	Motor	1,000	14	Strom	Spl-press	Wet-d	Selec	Amid	3	9½-1	Bevel-4	T-arm	½-Ell	Plat	Right	Right	Springs	Four Wheel Drive, G
Cent	Motor	1,000	14	Strom	Spl-press	Wet-d	Selec	Amid	3	9 -1	Bevel-4	T-arm	½-Ell	Plat	Right	Right	Springs	Four Wheel Drive, B
Cent	Motor	1,000	10	Strom	Spl-press	Wet-d	Selec	Amid	3	12½-1	Bevel-4	T-arm	½-Ell	Plat	Right	Right	Springs	Four Wheel Drive, M
None	None			Holley	Circ-spl	Cone	Prog	Unit-m	3	8 -1	Int-gear	Springs	½-Ell	½-Ell	Right	Cent	Springs	Fremont-Mais, O

Carbureter Make, Strom, *Stromberg.* Scheb, *Schebler;* Ray, *Rayfield;* Excel, *Excelsior;* King, *Kingston;* B-Z, *Breeze-Zephyr.* **Lubrication,** Splash, *non-circulating or simple splash;* Circ-spl, *circulating-splash;* Spl-press, *splash-pressure;* Fuel-inj, *fuel injection, oil mixed with fuel;* Pressure, *pressure feed, no splash.* **Clutch Type,** Dry-p, *dry plate;* Dry-d, *dry multiple disk;* Wet-d, *wet disk or disk-in-oil;* R-cone, *reversed cone, or inverted cone;* Exp-s, *expanding shoe;* Cont-b, *contracting band.* **Gearset Type,** Prog, *progressive sliding gear;* Selec, *selective sliding gear;* Plan, *planetary;* Ind-c, *constant-mesh individual-clutch;* Fric, *friction;* Hyd, *hydraulic;* Elec, *electric.* **Gearset Location,** Amid, *amidships;* Unit-m, *unit with motor;* Unit-j, *unit with jackshaft;* Unit-x, *unit with axle;* Unit-s, *unit driveshaft.* **Final Drive,** Bevel, *direct bevel;* Doub-r, *double-reduction, bevel and spur;* Int-g, *internal gear;* Top worm, *worm gear with worm on top;* Dbl chn, *double chain;* Sing chn, *single chain;* -f, *to front wheels;* -4, *to all four wheels.* **Driving Torque,** R-r, *radius rods;* T-arm, *torque-arm;* Tor-t, *torsion tube;* Sub-f, *sub-frame.* **Springs,** Ellip, *elliptic;* ½-Ell, *half-elliptic;* ¼-Ell, *quarter-elliptic;* ¾-Ell, *three-quarters-elliptic;* Plat, *platform;* T-ell, *transverse elliptic;* Cant, *cantilever;* Comb, *combination of half-elliptic and elliptic on double frames.* **Steering,** Cent, *center.* **Levers,** Cent, *center;* C&r, *gearshift center, brake right;* C&l, *gearshift center, brake left;* St-col, *steering column.* **Propulsion,** R-r, *radius rods;* T-arm, *torque arm;* Tor-t, *torsion tube;* Sub-f, *sub-frame.*

Complete Specifications of 1915 American Commercial Vehicles,

Name and Model	Load Capacity in Pounds	Price of Chassis	Wheelbase in Inches	TIRES			MOTOR												
				Kind	SIZES IN INCHES		Location	CYLINDERS			S.A.E. H.P.	Cylinders Cast	Valves Placed	COOLING		IGNITION		
					Front	Rear		No.	Bore in Ins.	Stroke in Ins.				Water Circulation	Radiator Type	Type	Make	Spark Advance
Gabriel, K	1,000	1,200	112	Pneu	32x4	32x4	Under hood	4	3.50	5.00	19.61	Block	R&H	Cent	Z-z-t	Sing	Bosch	Fixed
Gabriel, H	1,500	1,600	126	Pneu	34x4½	34x4½	Under hood	4	3.75	5.25	22.50	Block	L&H	Cent	Z-z-t	Sing	Bosch	Hand
Gabriel, M	3,000	2,300	144	Pneu	36x5	36x5d	Under hood	4	4.12	5.25	27.20	Block	L&H	Cent	Z-z-t	Sing	Bosch	Hand
Garford, L	4,000	3,000	128*	Solid	36x5	40x3½d	Betw. seats	4	4.25	5.25	36.15	Block	Left	Cent	Sq-t	Dual	Bosch*	Hand
Garford, J	6,000	3,500	128*	Solid	36x5	40x4d	Betw. seats	4	4.25	5.25	36.15	Block	Left	Cent	Sq-t	Dual	Bosch*	Hand
Garford, K	8,000	3,850	128*	Solid	36x5	40x5d	Betw. seats	4	4.25	5.25	36.15	Block	Left	Cent	Sq-t	Dual	Bosch*	Hand
Garford, D	10,000	4,500	128*	Solid	36x6	40x6d	Betw. seats	4	4.25	5.25	29.00	Block	Left	Cent	Sq-t	Dual	Bosch*	Hand
Garford, F	12,000	4,850	128*	Solid	36x6	40x7d	Betw. seats	4	4.25	5.25	29.00	Block	Left	Cent	Sq-t	Dual	Bosch*	Hand
GASchacht, 2	4,000	2,800	138	Solid	38x3½	40x3½d	Under hood	4	4.25	5.50	29.00	Block	R&H	Cent	Cell	Sing	Eisemann	Hand
GASchacht, 3	6,000	3,200	150	Solid	38x4	40x4d	Under hood	4	4.25	5.50	29.00	Block	R&H	Cent	Cell	Sing	Eisemann	Hand
Geneva, B	1,500	700	96	Solid	34x2	36x2½	Under hood	2	5.12	4.50	21.10	Sing		Gear	Finned	Sing	Opt	Fixed
GMC, 15	1,500	1,090	122	Pneu	35x5	35x5	Under hood	4	3.50	5.00	19.61	Block	Right	Cent	Finned	Sing	Eisemann	Hand
GMC, VC	2,500	1,500	126	Solid	34x3	36x5	Under hood	4	3.50	5.25	19.61	Block	Right	Cent	Finned	Sing	Bosch	Hand
GMC, SC	4,000	1,900	143	Solid	34x4	36x3½d	Under hood	4	4.00	6.00	25.60	Block	Right	Cent	Finned	Sing	Bosch	Hand
GMC, HU	7,000	2,500	158	Solid	36x5	42x5d	Under hood	4	5.00	5.00	40.00	Pairs	Left	Cent	Finned	Double	Mea	Hand
GMC, KU	10,000	3,000	158	Solid	36x6	42x6d	Under hood	4	5.00	5.00	40.00	Pairs	Left	Cent	Finned	Double	Mea	Hand
Gramm, 1½	3,000	2,600	129	Solid	34x3½	38x5	Betw. seats	4	3.75	5.25	22.50	Block	Left	Cent	Sq-t	Sing	Mea	Hand
Gramm, 2	4,000	3,600	128	Solid	36x4	36x3½d	Betw. seats	4	4.50	5.50	32.40	Pairs	Left	Cent	Sq-t	Sing	Mea	Hand
Gramm, 3½	7,000	4,600	140	Solid	36x5	36x5d	Betw. seats	4	4.50	5.50	32.40	Pairs	Left	Cent	Sq-t	Sing	Mea	Hand
Gramm, 5	10,000	5,350	140	Solid	36x5	40x6d	Betw. seats	4	4.50	5.50	32.40	Pairs	Left	Cent	Sq-t	Sing	Mea	Hand
Harvey, F	3,000	1,800	130	Solid	34x3½	38x5	Under hood	4	3.75	5.50	22.50	Block	Right	Cent	Z-z-t	Sing	Eisemann	Auto
Harvey, H	6,000	3,000	168	Solid	36x5	40x5d	Under hood	4	4.25	5.50	29.00	Block	Left	Cent	Z-z-t	Sing	Eisemann	Auto
Horner, 1	2,000	2,000	145	Solid	34x3½	34x4	Under hood	4	4.12	5.25	27.20	Block	Left	Gear	Finned	Dual	Bosch	Hand
Horner, 1½	3,000	2,250	145	Solid	36x4	36x5	Under hood	4	4.12	5.25	27.20	Block	Left	Gear	Finned	Dual	Bosch	Hand
Horner, 2	4,000	2,650	145	Solid	36x4	36x3½d	Under hood	4	4.12	5.25	27.20	Block	Left	Gear	Finned	Dual	Bosch	Hand
Horner, 3	6,000	3,200	145	Solid	36x5	40x4d	Under hood	4	4.50	5.50	32.40	Pairs	Left	Cent	Finned	Dual	Bosch	Hand
Horner, 5	10,000	4,200	156	Solid	38x6	42x6d	Under hood	4	5.25	5.75	44.20	Pairs	Opp	Gear	Finned	Dual	Bosch	Hand
Hupmobile, HT	800	850	106	Pneu	33x4	33x4	Under hood	4	3.25	5.50	16.92	Block	Left	Thermo	Cell	Sing	Bosch	Hand
I. H. C., M	1,000	.....	90	Solid	42x2	42x2	Under seat	2	4.50	5.00	16.20	Sing	Head	Cent	Finned	Dual	Heinze	Hand
Independent, F	1,500	1,285	112*	Solid	36x3	36x3	Under hood	4	3.50	5.00	19.61	Block	Right	Thermo	Z-z-t	Sing	Mea	Hand
Independent, E	3,000	1,850	122*	Solid	36x3½	36x5	Under hood	4	3.75*	5.25	22.50	Block	Left	Cent	Z-z-t	Sing	Mea	Hand
Indiana, B	3,000	1,800	135	Solid	36x3½	36x5	Under hood	4	3.75	5.25	22.50	Block	Left	Cent	Finned	Dual	Bosch	Hand
Indiana, F	6,000	2,500	144	Solid	36x4	36x3½d	Under hood	4	4.25	5.25	29.00	Sing	Left	Cent	Finned	Dual	Bosch	Hand
Indiana, K	10,000	3,200	165	Solid	36x5	40x4d	Under hood	4	4.75	5.00	36.15	Sing	Left	Cent	Finned	Dual	Bosch	Hand
Jeffery, 1515	1,500	1,300	118	Pneu	34x4½	34x4½	Under hood	4	3.75	5.25	22.50	Block	Right	Cent	Sq-t	Dual	Remy	Hand
Jeffery, 3015	3,000	1,650	130	Solid	34x3½	34x5	Under hood	4	3.75	5.25	22.50	Block	Right	Cent	Sq-t	Dual	Remy	Hand
Jeffery, 4015	4,000	2,750	124	Solid	36x5	36x5	Under hood	4	3.75	5.25	22.50	Block	Right	Cent	Z-z-t	Dual	Bosch	Hand
Kalamazoo, B	3,000	1,590	126	Solid	37x3½	37x5	Under hood	4	3.75	5.50	22.50	Block	Right	Cent	Z-z-t	Sing	Bosch	Hand
Kelly, K-30	2,000	2,000	120*	Solid	36x3½	36x4	Under hood	4	3.75	5.25	22.50	Block	Right	Cent	Cell	Sing	Eisemann	Auto
Kelly, KE-35	4,000	2,750	144*	Solid	36x4	36x4d	Under hood	4	3.75	5.25	22.50	Block	Right	Cent	Cell	Sing	Eisemann	Auto
Kelly, K-40	7,000	3,400	150*	Solid	38x5	38x5d	Under hood	4	4.50	6.50	32.40	Pairs	Opp	Cent	Cell	Sing	Eisemann	Auto
Kelly, K-50	10,000	4,250	150*	Solid	38x6	40x6d	Under hood	4	4.50	6.50	32.40	Pairs	Opp	Cent	Cell	Sing	Eisemann	Auto
King, 3½	7,000	3,200	120	Solid	36x5	36x5d	Under floor	4	4.50	5.50	32.40	Pairs	Left	Cent	Z-z-t	Dual	Bosch	2-pt
Kisselkar, 1500	1,500	1,500	125	Pneu	35x4½	35x4½	Under hood	4	4.25	5.25	29.00	Pairs	Left	Cent	Sq-t	Dual	Bosch	Hand
Kisselkar, 1	2,000	1,850	140	Pneu	37x5	37x5	Under hood	4	4.50	5.25	32.40	Pairs	Left	Cent	Sq-t	Dual	Bosch	Hand
Kisselkar, 1½	3,000	2,100	132*	Solid	34x3½	38x5	Under hood	4	4.25	5.25	29.00	Pairs	Left	Cent	Sq-t	Dual	Bosch	Hand
Kisselkar, 2½	5,000	2,750	144*	Solid	36x4	38x4d	Under hood	4	4.50	5.25	32.40	Pairs	Left	Cent	Sq-t	Dual	Bosch	Hand
Kisselkar, 3½	7,000	3,350	162	Solid	36x5	40x5d	Under hood	4	4.87	5.00	38.25	Pairs	Left	Cent	Sq-t	Dual	Bosch	Hand
Kisselkar, 6	12,000	4,350	168	Solid	36x6	40x6d	Under hood	4	4.87	5.00	38.25	Pairs	Left	Cent	Sq-t	Dual	Bosch	Hand
Kleiber, 1	3,000	2,000	140*	Solid	36x3½	36x5d	Under hood	4	4.12	5.25	27.20	Block	Left	Cent	Z-z-t	Dual	Bosch*	Hand*
Kleiber, 2	5,000	2,750	150*	Solid	36x4	36x4d	Under hood	4	4.12	5.25	27.20	Block	Left	Cent	Z-z-t	Dual	Bosch*	Hand*
Kleiber, 3	7,000	3,300	160*	Solid	36x4½	36x5d	Under hood	4	4.50	5.50	32.40	Pairs	Left	Cent	Z-z-t	Dual	Bosch*	Hand*
Kleiber, 5	10,000	4,000	170	Solid	36x5	40x6d	Under hood	4	5.00	5.75	40.00	Pairs	Opp	Cent	Z-z-t	Dual	Bosch*	Hand*
Knox Tractor, 31	12,000	3,250	139	Solid	34x5	36x5d	Under hood	4	5.00	5.50	40.00	Sing	Head	Cent	Cell	Dual-d	Bosch	Hand
Knox Tractor, 32	20,000	3,750	140	Solid	34x5	38x6d	Under hood	4	5.00	5.50	40.00	Sing	Head	Cent	Cell	Dual-d	Bosch	Hand
Koehler, 1	2,000	725	90	Solid	36x2½	36x2½	Under body	2	5.25	4.00	22.10	Sing	Top	Thermo	Finned	Sing		Fixed
Kosmath, 14	1,000	850	110	Pneu	32x3½	34x4	Under hood	4	3.50	4.00	19.61	Pairs	Right	Cent	Finned	Sing	Eisemann	Fixed
Krebs, G	2,000	1,900	118	Solid	34x3½	34x4	Under hood	4	3.75	5.25	22.50	Block	Left	Cent	Finned	Sing	Bosch	Auto
Krebs, H	4,000	2,350	144*	Solid	36x4	36x6	Under hood	4	4.12	5.25	27.20	Block	Left	Cent	Finned	Sing	Bosch	Auto
LaFrance, 6	10,000	5,500	140	Solid	36x5	38x6d	Under hood	4	5.50	6.00	48.48	Pairs	Opp	Cent	Cell	Dual	Bosch	Fixed
Lambert, V1	800	900	106	Pneu	30x3½	31x4	Under hood	4	3.75	4.50	22.50	Pairs	Right	Cent	Cell	Sing	Bosch	Fixed
Lambert, V2	1,500	1,125	114	Pneu*	33x4*	33x4½*	Under hood	4	3.75	4.50	22.50	Pairs	Right	Cent	Cell	Sing	Bosch	Fixed
Lambert, V3	2,000	.....	120	Solid	36x3	36x3½	Under hood	4	4.06	4.50	26.27	Block	Left	Cent	Cell	Dual	Briggs	Hand
Lambert, V4	3,000	1,900	120	Solid	36x4½	36x4	Under hood	4	4.50	5.00	32.40	Pairs	Left	Cent	Cell	Dual	Briggs	Hand
Lambert, V5	4,000	2,200	120	Solid	36x4	36x5	Under hood	4	4.50	5.00	32.40	Pairs	Left	Cent	Cell	Dual	Briggs	Hand
Lange, C	3,000	2,250	125	Solid	36x3½	38x4	Under hood	4	3.75	5.25	22.50	Block	Left	Thermo	Sq-t	Double	Conn	Hand
Lange, B	5,000	3,000	136	Solid	36x4	38x6	Under hood	4	4.12	5.25	27.20	Block	Left	Thermo	Sq-t	Double	Conn	Hand
Lewis, 21	5,000	2,900	144	Solid	34x3½	36x3½d	Under hood*	4	4.25	5.00	29.00	Pairs	Opp	Cent	Sq-t	Dual	Bosch	Hand
Lewis, 31	6,000	3,250	144	Solid	34x4	36x5d	Under hood*	4	4.25	5.00	29.00	Pairs	Opp	Cent	Sq-t	Dual	Bosch	Hand
Lewis, 51	10,000	4,400	144*	Solid	36x6	38x6d	Under floor	4	4.75	5.50	36.15	Pairs	Opp	Cent	Sq-t	Dual	Bosch	Hand

ABBREVIATIONS: General, *, *with other options;* Opt, *optional.* **Price,** -c, *complete with body.* **Tires, Kind,** Pneu, *pneumatic;* Sol-st, *solid in front, steel in rear;* P&s, *pneumatic in front, solid in rear;* P&c, *pneumatic in front, cushion in rear.* C&s, *cushion in front, solid in rear.* **Tire Sizes,** d, *dual.* **Motor Location,** Betw seats, *between seats.* **Cylinder Cast,** Sing, *singly or individually.* **Location of Valves,** Opp, *opposite, or T-head type;* Top (2-cylinder motors only), *L-head cylinder laid horizontal with valves up;* R&h, *at right and in head, L-head cylinder;* L&h, *at left and in head, L-head cylinder;* 2-cyc, *two-cycle motor, no valves;* Back, *L-head motor placed transversely with valves at rear.* **Water Circulation,** Cent, *centrifugal pump;* Gear, *gear pump;* Thermo, *thermo-syphon circulation;* Air, *air-cooled, no water.* **Radiator Type,** Finned, *finned-tube;* Cell, *cellular or honeycomb;* Sq-t, *square-tube or flat-tube;* Z-z-t, *zig-zag-tube or crimped flat-tube.* **Ignition, Type,** Sing, *single;* Doub, *double;* Dual-d, *dual-double.* **Make of Magneto** (or other sparking device), Split, *Splitdorf;* Conn, *Connecticut;* King, *Kingston;* West, *Westinghouse;* Day-D, *Dayton-Dick;* Atw-K, *Atwater-Kent.* **Spark Advance,** Auto, *automatic;* 2-pt, *two-point fixed, battery circuit fixed in retard, magneto in advance.* **Governor Type,** Cent, *centrifugal;* L-b, *loose-ball;* Suct, *suction;* Hyd. *hydraulic.* **Governor Drive,** Motor, *from motor;* D-shft *from driving shaft;* F-wheel, *from front wheel;* Gearset, *from gearset countershaft;* Duplex, *from both the motor and the driving shaft, by overrunning clutches.*

Including Capacity, Motor Speed, Final Drive, Horsepower, Etc.

MOTOR						TRANSMISSION							SPRINGS		CONTROL			
GOVERNOR		SPEEDS		Carbureter Make	Lubrication	Clutch Type	GEARSET			Total Gear-Ratio in High	Final Drive	Torque Taken By	Front	Rear	Steer	Levers	Propulsion Taken By	Name and Model
Type	Drive	Motor in R.p.m.	Truck in M.p.h				Type	Location	Speeds									
.....	.....	.....	30	Opt	Spl-press	Cone	Selec	Unit-m	3	4 -1	Bevel	T-arm	½-Ell	½-Ell	Left	Cent	Springs	Gabriel, K
.....	.....	.....	35	Strom	Spl-press	Cone	Selec	Amid	3	4½-1	Bevel	T-arm	½-Ell	½-Ell	Left	Cent	Springs	Gabriel, H
.....	.....	.....	20	Strom	Spl-press	Cone	Selec	Amid	4	8 -1	Bevel	T-arm	½-Ell	½-Ell	Left	Cent	Springs	Gabriel, M
Cent	Motor	1,140	14½	Own	Spl-press	Cone	Selec	Unit-j	3	9½-1	Dbl chn	.....	½-Ell	½-Ell	Right	Right	R-r	Garford, L
Cent	Motor	1,140	12⅔	Own	Spl-press	Cone	Selec	Unit-j	3	10⅔	Dbl chn	.....	½-Ell	½-Ell	Right	Right	R-r	Garford, J
Cent	Motor	1,140	10¾	Own	Spl-press	Cone	Selec	Unit-j	3	12½-1	Dbl chn	.....	½-Ell	½-Ell	Right	Right	R-r	Garford, K
Cent	Motor	1,140	10½	Own	Spl-press	Cone	Selec	Unit-j	4	13½-1	Dbl chn	.....	½-Ell	½-Ell	Right	Right	R-r	Garford, D
Cent	Motor	1,140	8⅝	Own	Spl-press	Cone	Selec	Unit-j	4	15⅝-1	Dbl chn	.....	½-Ell	½-Ell	Right	Right	R-r	Garford, F
Cent	Motor	1,000	15	Scheb	Spl-press	Cone	Selec	Amid	3	7½-1	Top-worm	T-arm	½-Ell	Plat	Left	Cent	R-r	GASchacht, 2
Cent	Motor	1,000	12	Scheb	Spl-press	Cone	Selec	Amid	3	9⅝-1	Top worm	T-arm	½-Ell	Plat	Left	Cent	R-r	GASchacht, 3
.....	.....	.....	18	Scheb	Spl-press	Wet-d	Plan	Unit-j	2	8 -1	Dbl chn	.....	½-Ell	Ellip	Right	Right	R-r	Geneva, B
Suct	Motor	1,150	20	Marvel	Spl-press	Cone	Selec	Amid	3	6 -1	Bevel	R-r	½-Ell	Ellip	Left	Cent	R-r	GMC, 15
Cent	Motor	1,130	14	King	Spl-press	Cone	Selec	Unit-j	3	9 -1	Dbl chn	.....	½-Ell	½-Ell	Left	Cent	R-r	GMC, VC
Cent	Motor	900	12	King	Spl-press	Cone	Selec	Unit-j	3	8 -1	Dbl chn	.....	½-Ell	½-Ell	Left	Cent	R-r	GMC, SC
Cent	Motor	800	11	Marvel	Spl-press	Wet-d	Prog	Unit-j	3	9 -1	Dbl chn	.....	½-Ell	½-Ell	Left	Cent	R-r	GMC, HU
Cent	Motor	800	8½	Marvel	Spl-press	Wet-d	Prog	Unit-j	3	12 -1	Dbl chn	.....	½-Ell	½-Ell	Left	Cent	R-r	GMC, KU
Cent	Motor	.....	.....	Opt	Circ-spl	Cone	Selec	Unit-j	3	.....	Dbl chn	.....	½-Ell	½-Ell	Left	Cent	R-r	Gramm, 1½
Cent	Motor	.....	.....	Opt	Circ-spl	Cone	Selec	Unit-j	3	.....	Dbl chn	.....	½-Ell	½-Ell	Right	Right	R-r	Gramm, 2
Cent	Motor	.....	.....	Opt	Circ-spl	Cone	Selec	Unit-j	3	.....	Dbl chn	.....	½-Ell	½-Ell	Right	Right	R-r	Gramm, 3½
Cent	Motor	.....	.....	Opt	Circ-spl	Cone	Selec	Unit-j	3	.....	Dbl chn	.....	½-Ell	½-Ell	Right	Right	R-r	Gramm, 5
L-b	Motor	1,000	16	Holley	Circ-spl	Cone	Selec	Unit-j	3	8½-1	Dbl chn	.....	½-Ell	½-Ell	Left	Cent	R-r	Harvey, F
L-b	Motor	900	10	Holley	Circ-spl	Cone	Selec	Unit-j	4	10½-1	Dbl chn	.....	½-Ell	½-Ell	Left	Cent	R-r	Harvey, H
Cent	Motor	1,200	19	Strom	Circ-spl	Dry-d	Selec	Amid	3	6½-1	Dbl chn	.....	½-Ell	Plat	Left	Cent	R-r	Horner, 1
Cent	Motor	1,200	15	Strom	Circ-spl	Dry-d	Selec	Amid	3	7 -1	Dbl chn	.....	½-Ell	Plat	Left	Cent	R-r	Horner, 1½
Cent	Motor	1,200	15	Strom	Circ-spl	Dry-d	Selec	Amid	3	9½-1	Dbl chn	.....	½-Ell	Plat	Left	Cent	R-r	Horner, 2
Cent	Motor	1,140	12	Strom	Circ-spl	Dry-d	Selec	Amid	3	9½-1	Dbl chn	.....	½-Ell	Plat	Left	Cent	R-r	Horner, 3
Cent	Motor	1,000	10	Strom	Circ-spl	Dry-d	Selec	Amid	3	13⅝-1	Dbl chn	.....	½-Ell	Plat	Left	Cent	R-r	Horner, 5
Cent	Motor	1,500	20	Zenith	Circ-spl	Dry-d	Selec	Unit-m	3	4 -1	Bevel	Tor-t	½-Ell	Plat	Right	Cent	Tor-t	Hupmobile, HT
.....	.....	.....	.....	Scheb	Spl-press	Cont-b	Ind-e	Unit-m	2	9½-1	Dbl chn	.....	Ellip	Ellip	Right	Right	R-r	I.H.C., M
Cent	Motor	1,350	18	Zephyr	Circ-spl	Dry-d	Selec	Unit-m	3	7½-1	Top worm	Springs	½-Ell	½-Ell	Left	Cent	Springs	Independent, F
Cent	Motor	1,200	15	Zephyr	Circ-spl	Cone	Selec	Unit-j	3	8¼-1	Dbl chn	.....	½-Ell	Plat	Right	Right	R-r	Independent, E
L-b	D-shft	1,200	17½	Scheb	Circ-spl	Dry-d	Selec	Unit-j	3	7½-1	Dbl chn	.....	½-Ell	½-Ell	Left	Cent	R-r	Indiana, B
L-b	D-shft	1,200	15½	Scheb	Circ-spl	Dry-d	Selec	Unit-j	3	8½-1	Dbl chn	.....	½-Ell	½-Ell	Left	Cent	R-r	Indiana, F
L-b	D-shft	1,200	14⅔	Scheb	Circ-spl	Dry-d	Selec	Unit-j	3	9½-1	Dbl chn	.....	½-Ell	½-Ell	Left	Cent	R-r	Indiana, K
Suct	Motor	1,100	22	Strom	Spl-press	Dry-p	Selec	Amid	3	4 -1	Bevel	Tor-t	½-Ell	½-Ell	Left	Cent	Tor-t	Jeffery, 1515
Suct	Motor	1,100	15	Strom	Spl-press	Dry-p	Selec	Unit-j	3	7½-1	Dbl chn	.....	½-Ell	½-Ell	Left	Cent	R-r	Jeffery, 3015
Suct	Motor	1,100	14½	Strom	Spl-press	Dry-p	Selec	Amid	4	7¾-1	Int-g4	Springs	½-Ell	½-Ell	Left	Cent	Springs	Jeffery, 4015
Cent	D-shft	1,600	15	Scheb	Circ-spl	Cone	Selec	Unit-j	3	.....	Dbl chn	.....	½-Ell	½-Ell	Left	Cent	R-r	Kalamazoo, B
L-b	Motor	1,200	15	Breeze	Pressure	Cone	Selec	Amid	3	8¾-1	Dbl chn	.....	½-Ell	½-Ell	Left	Cent	R-r	Kelly, K-30
L-b	Motor	1,200	11½	Breeze	Pressure	Cone	Selec	Amid	3	11½-1	Dbl chn	.....	½-Ell	½-Ell	Left	Cent	R-r	Kelly, K-35
L-b	Motor	900	9½	Ray	Pressure	Cone	Selec	Amid	3	11 -1	Dbl chn	.....	½-Ell	½-Ell	Left	Cent	R-r	Kelly, K-40
L-b	Motor	900	8⅝	Ray	Pressure	Cone	Selec	Amid	3	12½-1	Dbl chn	.....	½-Ell	½-Ell	Left	Cent	R-r	Kelly, K-50
Cent	Motor	950	12	Scheb	Circ-spl	Dry-d	Ind-e	Unit-j	3	8¾-1	Dbl chn	.....	½-Ell	½-Ell	Right	Right	R-r	King, 3½
Cent	Motor	1,200	25	Strom	Circ-spl	Cone	Selec	Amid	3	5 -1	Bevel	Tor-t	½-Ell	½-Ell	Left	Cent	Springs	Kisselkar, 1500
Cent	Motor	1,200	25	Strom	Circ-spl	Cone	Selec	Amid	4	4½-1	Bevel	Tor-t	½-Ell	½-Ell	Left	Cent	Springs	Kisselkar, 1
Cent	Motor	1,200	15	Strom	Circ-spl	Cone	Selec	Unit-j	4	8 -1	Dbl chn	.....	½-Ell	½-Ell	Left	Cent	R-r	Kisselkar, 1½
Cent	Motor	1,200	12	Strom	Circ-spl	Cone	Selec	Unit-j	4	10 -1	Dbl chn	.....	½-Ell	½-Ell	Left	Cent	R-r	Kisselkar, 2½
Cent	Motor	1,200	11	Strom	Circ-spl	Cone	Selec	Unit-j	4	11 -1	Dbl chn	.....	½-Ell	½-Ell	Left	Cent	R-r	Kisselkar, 3½
Cent	Motor	1,200	10	Strom	Circ-spl	Cone	Selec	Unit-j	4	12½-1	Dbl chn	.....	½-Ell	½-Ell	Left	Cent	R-r	Kisselkar, 6
Cent	Motor	1,200	18	Scheb*	Circ-spl	Wet-d	Selec	Unit-j	3	7 -1*	Dbl chn	.....	½-Ell	½-Ell	Right	Cent	R-r	Kleiber, 1
Cent	Motor	1,200	16	Scheb*	Circ-spl	Wet-d	Selec	Unit-j	3	9½-1*	Dbl chn	.....	½-Ell	½-Ell	Right	Cent	R-r	Kleiber, 2
Cent	Motor	1,100	14	Scheb*	Circ-spl	Wet-d	Selec	Unit-j	3	9 -1*	Dbl chn	.....	½-Ell	½-Ell	Right	Cent	R-r	Kleiber, 3
Cent	Motor	1,000	12	Scheb*	Circ-spl	Wet-d	Selec	Unit-j	3	9½-1*	Dbl chn	.....	½-Ell	½-Ell	Right	Cent	R-r	Kleiber, 5
Cent	Motor	1,100	12	Strom	Pressure	Dry-p	Selec	Amid	3	11 -1	Dbl chn	.....	½-Ell	Cant	Right	Cent	R-r	Knox Tractor, 31
Cent	Motor	1,100	10½	Strom	Pressure	Dry-p	Selec	Unit-j	3	12⅛-1	Dbl chn	.....	½-Ell	Cant	Right	Cent	R-r	Knox Tractor, 32
.....	.....	.....	20	King	Splash	Cone	Plan	Unit-j	2	8 -1*	Dbl chn	.....	½-Ell	Ellip	Left	Cent	R-r	Koehler, 1
.....	.....	1,100	25	Holley	Splash	Cone	Selec	Unit-m	3	4 -1	Bevel	R-r	½-Ell	Ellip	Left	.....	R-r	Kosmath, 14
Cent	Motor	1,025	15	Scheb	Circ-spl	Cone	Selec	Amid	3	6¾-1	Top worm	Springs	½-Ell	½-Ell	Left	Cent	Springs	Krebs, G
Cent	Motor	1,100	15	Scheb	Circ-spl	Cone	Selec	Amid	3	7¼-1	Top worm	Springs	½-Ell	½-Ell	Left	Cent	Springs	Krebs, H
Cent	Motor	1,200	12	Scheb	Spl-press	None	Hyd	Unit-j	Any	10⅝-1	Dbl chn	.....	½-Ell	½-Ell	Right	Right	R-r	LaFrance, 6
.....	.....	.....	.....	Excel	Spl-press	None	Fric	Amid	Any	3½-1	Sing chn	.....	½-Ell	Ellip	Right	Right	R-r	Lambert, V1
.....	.....	.....	.....	Excel	Spl-press	None	Fric	Amid	Any	6 -1	Dbl chn	.....	½-Ell	½-Ell	Right	Right	R-r	Lambert, V2
.....	.....	.....	.....	Scheb	Spl-press	None	Fric	Amid	Any	6 -1	Dbl chn	.....	½-Ell	½-Ell	Right	Right	R-r	Lambert, V3
Suct	Motor	800	10	Scheb	Spl-press	None	Fric	Amid	Any	10½-1	Dbl chn	.....	½-Ell	½-Ell	Right	Right	R-r	Lambert, V4
Suct	Motor	800	9	Scheb	Spl-press	None	Fric	Amid	Any	10½-1	Dbl chn	.....	½-Ell	½-Ell	Right	Right	R-r	Lambert, V5
Cent	Motor	1,250	18	Strom	Circ-spl	Wet-d	Ind-e	Unit-j	3	8 -1	Dbl chn	.....	½-Ell	½-Ell	Left	Cent	R-r	Lange, C
Cent	Motor	1,250	15	Strom	Circ-spl	Wet-d	Ind-e	Unit-j	3	9½-1	Dbl chn	.....	½-Ell	½-Ell	Left	Cent	R-r	Lange, B
Cent	Motor	1,200	14	Ray	Spl-press	Wet-d	Ind-e	Amid	3	8 -1	Dbl chn	.....	½-Ell	Plat	Right	Right	R-r	Lewis, 21
Cent	Motor	1,200	12	Ray	Spl-press	Wet-d	Ind-e	Amid	3	8¾-1	Dbl chn	.....	½-Ell	Plat	Right	Right	R-r	Lewis, 31
Cent	Motor	1,000	10	Ray	Spl-press	Wet-d	Ind-e	Amid	3	10½-1	Dbl chn	.....	½-Ell	Plat	Right	Right	R-r	Lewis, 51

Carbureter Make, Strom, *Stromberg;* Scheb, *Schebler;* Ray, *Rayfield;* Excel, *Excelsior;* King, *Kingston;* B-Z, *Breeze-Zephyr.* **Lubrication,** Splash, *non-circulating or simple splash;* Circ-spl, *circulating-splash;* Spl-press, *splash-pressure;* Fuel-inj, *fuel injection, oil mixed with fuel;* Pressure, *pressure feed, no splash.* **Clutch Type,** Dry-p, *dry plate;* Dry-d, *dry multiple disk;* Wet-d, *wet disk or disk-in-oil;* R-cone, *reversed cone or inverted cone;* Exp-s, *expanding shoe;* Cont-b, *contracting band.* **Gearset Type,** Prog, *progressive sliding gear;* Selec, *selective sliding gear;* Plan, *planetary;* Ind-c, *constant-mesh individual-clutch;* Fric, *friction;* Hyd, *hydraulic;* Elec, *electric.* **Gearset Location,** Amid, *amidships;* Unit-m, *unit with motor;* Unit-j, *unit with jackshaft;* Unit-x, *unit with axle;* Unit-s, *unit driveshaft.* **Final Drive,** Bevel, *direct bevel;* Doub-r, *double-reduction, bevel and spur;* Int-g, *internal gear;* Top worm, *worm gear with worm on top;* Dbl chn, *double chain;* Sing chn, *single chain;* -f, *to front wheels;* -4, *to all four wheels.* **Driving Torque,** R-r, *radius rods;* T-arm, *torque-arm;* Tor-t, *torsion tube;* Sub-f, *sub-frame.* **Springs,** Ellip, *elliptic;* ½-Ell, *half-elliptic;* ¼-Ell, *quarter-elliptic;* ¾-Ell, *three-quarters-elliptic;* Plat, *platform;* T-ell, *transverse elliptic;* Cant, *cantilever;* Comb, *combination of half-elliptic and elliptic on double frames.* **Steering,** Cent, *center.* **Levers,** Cent, *center;* C&r, *gearshift center, brake right;* C&l, *gearshift center, brake left;* St-col, *steering column.* **Propulsion,** R-r, *radius rods;* T-arm, *torque arm;* Tor-t, *torsion tube;* Sub-f *sub-frame.*

Complete Specifications of 1915 American Commercial Vehicles,

Name and Model	Load Capacity in Pounds	Price of Chassis	Wheelbase in Inches	TIRES			MOTOR												
				Kind	SIZES IN INCHES		Location	CYLINDERS			S.A.E. H.P.	Cylinders Cast	Valves Placed	COOLING		IGNITION		
					Front	Rear		No.	Bore in Ins.	Stroke in Ins.				Water Circulation	Radiator Type	Type	Make	Spark Advance
Lippard-Stew., B*	1,500	1,650	115*	Pneu	35x4½	35x4½	Under hood	4	3.75	5.25	22.50	Block	Left	Cent	Finned	Sing	Eisemann	Fixed
Lippard-Stew., BW*	1,500	1,775	115*	Pneu	35x4½	35x4½	Under hood	4	3.75	5.25	22.50	Block	Left	Cent	Finned	Sing	Eisemann	Fixed
Lippard-Stew., H	2,000	2,000	145	Solid	36x3	36x5	Under hood	4	3.75	5.25	22.50	Block	Left	Cent	Finned	Sing	Eisemann	Fixed
Lippard-Stew., F	3,000	2,300	145*	Solid	36x3½	36x3d	Under hood	4	4.12	5.25	27.20	Block	Left	Cent	Finned	Sing	Eisemann	Fixed
Lippard-Stew., G	4,000	2,600	158*	Solid	36x4	36x4d	Under hood	4	4.15	5.25	27.20	Block	Left	Cent	Finned	Sing	Eisemann	Fixed
Little Giant, H	2,000	1,350	110	Solid	37x3	37x3½	Under floor	4	3.75	4.50	22.50	Block	Right	Thermo	Finned	Dual	King	Hand
Locomobile, A2	10,000	4,500	140*	Solid	40x6	40x6d	Under floor	4	5.00	6.00	40.00	Pairs	Opp	Cent	Cell	Dual	Bosch	Hand
Locomobile, AA2	12,000	4,800	140*	Solid	40x7	40x7d	Under floor	4	5.00	6.00	40.00	Pairs	Opp	Cent	Cell	Dual	Bosch	Hand
M&E, B	7,000	3,500	132	Solid	36x6	36x5d	Under hood	4	4.50	5.50	32.40	Block	Right	Cent	Sq-t	Double	Bosch	Hand
M&E, G	10,000	2,750	116	Sol-st	36x5d	40x6	Under hood	4	4.25	5.25	29.00	Pairs	Right	Cent	Sq-t	Double	Bosch	Hand
Maccar, B	2,000	1,900	138*	Solid	36x4	36x5	Under hood	4	4.12	5.25	27.20	Block	Left	Cent	Finned	Dual	Eisemann	Hand
Maccar, E	2,000	1,900	138*	Solid	36x4	36x5	Under hood	4	4.12	5.25	27.20	Block	Left	Cent	Finned	Dual	Eisemann	Hand
Maccar, C	3,000	2,150	150*	Solid	36x4	36x6	Under hood	4	4.12	5.25	27.20	Block	Left	Cent	Finned	Dual	Eisemann	Hand
Maccar, F	4,000	2,400	150*	Solid	36x4	36x4d	Under hood	4	4.12	5.25	27.20	Block	Left	Cent	Finned	Dual	Eisemann	Hand
Maccar, D	4,000	2,400	150*	Solid	36x4	36x4d	Under hood	4	4.12	5.25	27.20	Block	Left	Cent	Finned	Dual	Eisemann	Hand
McIntyre, E	1,500	.....	120	Solid	34x3	34x3½	Under hood	4	3.75	5.00	22.50	Block	Right	Thermo	Cell	Sing	Bosch	Hand
McIntyre, A	3,000	.....	144	Solid	34x3½	36x3d	Under hood	4	4.12	5.25	27.20	Block	Left	Thermo	Cell	Sing	Bosch	Hand
McIntyre, G	6,000	.....	144	Solid	36x4	36x4d	Under hood	4	4.12	5.25	27.20	Block	Left	Thermo	Cell	Sing	Bosch	Hand
Mais, C	3,000	2,750	119	Solid	37x4	37x5	Under hood	4	4.00	5.25	25.60	Block	Opp	Cent	Cell	Sing	Eisemann	Auto
Mais, D	3,000	2,800	132	Solid	37x4	37x5	Under hood	4	4.00	5.25	25.60	Block	Opp	Cent	Cell	Sing	Eisemann	Auto
Mais, E	4,000	2,950	132	Solid	37x4	37x4d	Under hood	4	4.00	5.25	25.60	Block	Opp	Cent	Cell	Sing	Eisemann	Auto
Mais, F	4,000	3,000	145	Solid	37x4	37x4d	Under hood	4	4.00	5.25	25.60	Block	Opp	Cent	Cell	Sing	Eisemann	Auto
Mais, G	5,000	3,200	145	Solid	37x5	37x4d	Under hood	4	4.31	5.25	29.69	Block	Opp	Cent	Cell	Sing	Eisemann	Auto
Mais, H	6,000	3,400	160	Solid	37x5	37x5d*	Under hood	4	4.31	5.25	29.69	Pairs	Opp	Cent	Cell	Sing	Eisemann	Auto
Mais, Tractor	16,000	2,750	84	Solid	37x4	37x7	Under hood	4	4.31	5.25	29.69	Block	Opp	Cent	Cell	Sing	Eisemann	Auto
Martin, R	2,000	2,050	125	Solid	36x3½	36x4	Under hood	4	4.00	5.00	25.60	Block	Left	Cent	Finned	Dual	Remy	Hand
Martin, S	3,000	2,150	121	Solid	36x3½	40x4	Under floor	4	4.00	5.00	25.60	Block	Left	Cent	Finned	Dual	Remy	Hand
Martin, E	5,000	3,000	135	Solid	36x4	40x3½d	Under floor	4	4.25	5.00	27.20	Pairs	Opp	Cent	Finned	Dual	Remy	Hand
Martin, L	7,000	3,500	145	Solid	36x5	40x4d	Under floor	4	4.75	5.50	36.15	Pairs	Opp	Cent	Finned	Dual	Remy	Hand
Menominee, A3	1,500	1,125	112	Solid	33x3½	33x3½	Under hood	4	3.75	4.50	22.50	Pairs	Left	Cent	Finned	Dual	Bosch	Hand
Menominee, B3	2,000	1,400	122	Solid	34x3½	34x4	Under hood	4	4.00	5.00	25.60	Pairs	Left	Thermo	Finned	Dual	Bosch	Hand
Menominee, C	3,000	1,800	130	Solid	36x4	36x5	Under hood	4	4.00	5.00	25.60	Pairs	Left	Thermo	Finned	Dual	Bosch	Hand
Mercury, P	1,000	.....	84	Solid	38x2	40x2	Under floor	2	4.25	4.00	14.50	Sing	Opp	Air		Dual	Remy	Fixed
Modern, L	2,000	1,750	136	Solid*	36x3½	36x3½	Under hood	4	3.75	5.25	22.50	Block	Right	Cent	Cell	Dual	Bosch	Hand
Modern, H	3,000	1,950	136*	Solid	36x4	36x5*	Under hood	4	4.12	5.25	27.20	Block	Right	Cent	Cell	Dual	Bosch	Hand
Modern, M	3,000	2,000	136*	Solid	36x4	36x5*	Under hood	4	4.12	5.25	27.20	Block	Right	Cent	Cell	Dual	Bosch	Hand
Moon, B	3,000	1,800	125*	Solid	36x3½	36x4	Under hood	4	3.75	5.25	22.50	Block	Left	Gear	Cell	Dual	Remy	Hand
Moore, 1½	3,000	1,950	145	Solid	37x3½	37x4	Under hood	4	4.12	5.25	27.20	Block	Left	Cent	Sq-t	Dual	Bosch	Hand
Moore, 2	4,000	2,500	163	Solid	37x4	37x3½d	Under hood	4	4.50	5.50	32.40	Pairs	Left	Cent	Sq-t	Dual	Bosch	Hand
Moore, 3	6,000	3,150	142	Solid	37x5	37x4d	Under floor	4	4.50	5.50	32.40	Pairs	Left	Cent	Sq-t	Dual	Bosch	Hand
Moore, 4	8,000	3,500	153	Solid	37x5	37x5d	Under floor	4	4.75	5.50	36.15	Pairs	Opp	Cent	Sq-t	Dual	Bosch	Hand
Moore, 5	10,000	4,500	175	Solid	37x6	42x6d	Under floor	4	5.25	7.00	44.20	Pairs	Opp	Cent	Sq-t	Dual	Bosch	Hand
Moreland, 7X	1,500	1,800	126	Solid*	34x3½	34x3½	Under hood	4	3.75	5.25	22.50	Block	Left	Cent	Finned	Sing	West	Hand
Moreland, 1X	3,000	2,050	120	Solid	34x3½	34x5	Under floor	4	4.12	5.25	27.20	Block	Left	Cent	Finned	Sing	West	Hand
Moreland, 2X	5,000	2,650	144	Solid	34x4	34x4d	Under floor	4	4.50	5.50	32.40	Pairs	Left	Cent	Finned	Sing	West	Hand
Moreland, 3X	7,000	3,500	168	Solid	36x5	38x5d	Under floor	4	4.75	5.75	36.15	Pairs	Left	Cent	Finned	Sing	West	Hand
Moreland, 5X	10,000	4,000	168	Solid	36x6	40x6d	Under floor	4	4.75	6.75	36.15	Pairs	Left	Cent	Finned	Sing	West	Hand
Moreland, 6X	13,000	4,500	168	Solid	36x5	40x6d	Under floor	4	5.25	7.00	44.20	Pairs	Opp	Cent	Finned	Sing	Bosch	Hand
Motokart, 1&2	500	365	69	Pneu	26x2½	26x2½	Under seat	2	3.62	4.00	10.53	Sing	Head	Thermo	Sq-t	Sing	None	Hand
Natco, 20	2,000	1,925	104	Solid	36x3½	36x3½	Betw seats	4	3.50	5.00	19.61	Block	Right	Thermo	Finned	Sing	U & H	Fixed
Nelson & LeM., E1	2,000	1,800	Opt	Solid	36x3	36x4	Under hood	4	3.75	5.25	22.50	Block	L&H	Cent	Finned	Dual	Bosch	Fixed
Nelson & LeM., E1½	3,000	2,000	Opt	Solid	36x4	36x5	Under hood	4	4.12	5.25	27.20	Block	L&H	Cent	Finned	Dual	Bosch	Hand
Nelson & LeM., E2	4,000	2,250	Opt	Solid	36x4	36x6	Under hood	4	4.12	5.25	27.20	Block	L&H	Cent	Finned	Dual	Bosch	Hand
Neteo, C	3,000	2,250	144	Solid	36x3½	36x5	Under hood	4	4.12	5.25	27.20	Block	Left	Cent	Finned	Sing	Eisemann	Fixed
New York, L	3,000	2,000	129	Solid	36x3½	36x5	Under hood	4	3.75	5.25	22.50	Block	Left	Cent	Sq-t	Sing	Bosch	Fixed
O. K., C&D	1,200	875	112	Pneu	33x4	33x4	Under hood	4	3.50	5.00	19.61	Block	R&H	Thermo	Z-s-t	Sing	Bosch	Fixed
Old Hickory, 30W	3,000	1,900	110	Solid	33x3½	33x4	Under floor	4	3.75	5.00	22.50	Block	Right	Thermo	Z-s-t	Dual	Heinze	Hand
Old Reliable, 1½	3,000	2,250	138	Solid	34x3½	36x6	Under hood	4	3.75	5.00	22.50	Block	Left	Cent	Sq-t	Sing*	Bosch	Hand
Old Reliable, 2	4,000	2,750	120	Solid	34x4	36x4d	Under floor	4	4.25	5.00	29.00	Pairs	Opp	Cent	Sq-t	Sing*	Bosch	Hand
Old Reliable, 3	6,000	3,400	122	Solid	34x5	36x5d	Under floor	4	4.25	5.00	29.00	Pairs	Opp	Cent	Sq-t	Sing*	Bosch	Hand
Old Reliable, 4	8,000	4,000	126	Solid	36x5	36x5d	Under floor	4	4.75	5.50	36.15	Pairs	Opp	Cent	Sq-t	Sing*	Bosch	Hand
Old Reliable, 5	10,000	4,500	126	Solid	36x6	36x6d	Under floor	4	4.75	5.50	36.15	Pairs	Opp	Cent	Sq-t	Sing*	Bosch	Hand
Old Reliable, 7	14,000	5,000	126	Solid	36x6	40x7d	Under floor	4	4.75	6.75	36.15	Pairs	Left	Cent	Sq-t	Sing*	Bosch	Hand
Overland, 81	800	850-c*	106	Pneu	33x4	33x4	Under hood	4	4.00	4.50	25.60	Sing	Left	Thermo	Sq-t	Sing	Split	Hand
Packard, 2	4,000	2,800	120*	Solid	34x3½	34x4d	Under hood	4	4.06	5.12	26.39	Pairs	Opp	Cent	Cell	Sing	Eisemann	Auto
Packard, 3	6,000	3,400	126*	Solid	36x4	36x5d	Under hood	4	4.50	5.50	32.40	Pairs	Opp	Cent	Cell	Sing	Eisemann	Auto
Packard, 4	8,000	3,550	126*	Solid	36x5	40x5d	Under hood	4	4.50	5.50	32.40	Pairs	Opp	Cent	Cell	Sing	Eisemann	Auto
Packard, 5	10,000	4,150	144*	Solid	36x6	40x6d	Under hood	4	5.00	5.50	40.00	Pairs	Opp	Cent	Cell	Sing	Eisemann	Auto
Packard, 6	12,000	4,300	144*	Solid	36x6	42x7d	Under hood	4	5.00	5.50	40.00	Pairs	Opp	Cent	Cell	Sing	Eisemann	Auto
Palmer-Moore, D	2,000	1,300	102	Solid	36x2½	36x3	Under hood	3	4.00	4.00	.....	Sing	2-cy	Thermo	Finned	Sing	Bosch	Fixed
Paulding, O	800	650	95	Pneu	30x3	31x3½	Under hood	4	2.75	4.00	12.08	Block	R&H	Thermo	Finned	Dual	Day-D	Hand

ABBREVIATIONS: General, *, *with other options;* Opt, *optional.* **Price,** -c, *complete with body.* **Tires, Kind,** Pneu, *pneumatic;* Sol-st, *solid in front, steel in rear;* P&s, *pneumatic in front, solid in rear;* P&c *pneumatic in front, cushion in rear;* C&s, *cushion in front, solid in rear.* **Tire Sizes,** d, *dual.* **Motor Location,** Betw seats, *between seats.* **Cylinder Cast,** Sing, *singly or individually.* **Location of Valves,** Opp, *opposite, or T-head type;* Top (2-cylinder motors only), *L-head cylinder laid horizontal with valves up;* R&h, *at right and in head, L-head cylinder;* L&h *at left and in head, L-head cylinder;* 2-cyc, *two-cycle motor, no valves;* Back, *L-head motor placed transversely with valves at rear.* **Water Circulation,** Cent, *centrifugal pump;* Gear, *gear pump;* Thermo, *thermo-syphon circulation;* Air, *air-cooled, no water.* **Radiator Type,** Finned, *finned-tube;* Cell, *cellular or honeycomb;* Sq-t, *square-tube or flat-tube;* Z-s-t, *zig-zag-tube or crimped flat-tube.* **Ignition, Type,** Sing, *single;* Doub, *double;* Dual-d, *dual-double.* **Make of Magneto** (or other sparking device), Split, *Splitdorf;* Conn, *Connecticut;* King, *Kingston;* West, *Westinghouse;* Day-D, *Dayton-Dick;* Atw-K, *Atwater-Kent.* **Spark Advance,** Auto, *automatic;* 2-pt, *two-point fixed, battery circuit fixed in retard, magneto in advance.* **Governor Type,** Cent, *centrifugal;* L-b, *loose-ball;* Suct, *suction;* Hyd. *hydraulic.* **Governor Drive,** Motor, *from motor;* D-shft, *from driving shaft;* F-wheel, *from front wheel;* Gearset, *from gearset countershaft;* Duplex, *from both the motor and the driving shaft, by overrunning clutches.*

Including Capacity, Motor Speed, Final Drive, Horsepower, Etc.

MOTOR						TRANSMISSION							SPRINGS		CONTROL			
GOVERNOR		SPEEDS					GEARSET											
Type	Drive	Motor in R.p.m.	Truck in M.p.h.	Carburetor Make	Lubrication	Clutch Type	Type	Location	Speeds	Total Gear-Ratio in High	Final Drive	Torque Taken By	Front	Rear	Steer	Levers	Propulsion Taken By	Name and Model
Cent...	Motor...	1,230	25	Opt.....	Spl-press..	Cone....	Selec....	Amid.....	3	5½–1	Bevel.....	T-arm...	½-Ell....	½-Ell....	Left....	Cent....	Springs..	Lippard-Stew., B*
Cent...	Motor...	1,230	25	Opt.....	Spl-press..	Cone....	Selec....	Amid.....	3	6 –1	Top worm.	T-arm...	½-Ell....	½-Ell....	Left....	Cent....	Springs..	Lippard-Stew., BW*
Cent...	Motor...	1,134	18	Opt.....	Spl-press..	Cone....	Selec....	Amid.....	3	6½–1	Top worm.	Springs..	½-Ell....	½-Ell....	Left....	Cent....	Springs..	Lippard-Stew., H
Cent...	Motor...	1,300	18	Opt.....	Spl-press..	Cone....	Selec....	Amid.....	3	7½–1	Top worm.	Springs..	½-Ell....	½-Ell....	Left....	Cent....	Springs..	Lippard-Stew., F
Cent...	Motor...	1,295	15	Opt.....	Spl-press..	Cone....	Selec....	Amid.....	3	9½–1	Top worm.	Springs..	½-Ell....	½-Ell....	Left....	Cent....	Springs..	Lippard-Stew., G
.....	.....	1,200	12	Holley....	Circ-spl...	Wet-d..	Selec....	Unit-j.....	3	7½–1	Dbl chn...	.....	½-Ell....	½-Ell....	Left....	Cent....	R-r.....	Little Giant, H
Ring...	Motor...	900	10½	Own.....	Spl-press..	Dry-d...	Selec....	Unit-j.....	4	10½–1	Dbl chn...	.....	½-Ell....	½-Ell....	Right...	Right...	R-r.....	Locomobile, A2
Ring...	Motor...	900	10½	Own.....	Spl-press..	Dry-d...	Selec....	Unit-j.....	4	10½–1	Dbl chn...	.....	½-Ell....	½-Ell....	Right...	Right...	R-r.....	Locomobile, AA2
.....	.....	.....	15	Strom....	Circ-spl...	Wet-d..	Selec....	Unit-j.....	3	12 –1	Dbl chn-f..	.....	½-Ell....	½-Ell....	Left....	Cent....	R-r.....	M&E, B
.....	.....	.....	10	Strom....	Circ-spl...	Wet-d..	Selec....	Unit-m....	3	14 –1	Dbl chn-f..	.....	½-Ell....	½-Ell....	Right...	Right...	R-r.....	M&E, G
Cent...	Motor...	1,000	14	Strom....	Circ-spl...	Dry-d...	Selec....	Unit-m....	3	7½–1	Dbl chn...	.....	½-Ell....	Plat.....	Left....	Cent....	R-r.....	Maccar, B
Cent...	Motor...	1,000	16	Strom....	Circ-spl...	Dry-d...	Selec....	Unit-m....	3	6½–1	Top worm.	Springs..	½-Ell....	½-Ell....	Left....	Cent....	Springs.	Maccar, E
Cent...	Motor...	1,000	12	Strom....	Circ-spl...	Dry-d...	Selec....	Unit-m....	3	6½–1	Dbl chn...	.....	½-Ell....	Plat.....	Left....	Cent....	R-r.....	Maccar, C
Cent...	Motor...	1,000	12	Strom....	Circ-spl...	Dry-d...	Selec....	Unit-m....	3	8 –1	Dbl chn...	.....	½-Ell....	Plat.....	Left....	Cent....	R-r.....	Maccar, F
Cent...	Motor...	1,000	14	Strom....	Circ-spl...	Dry-d...	Selec....	Unit-m....	3	8 –1	Top worm.	Springs..	½-Ell....	½-Ell....	Left....	Cent....	Springs.	Maccar, D
None...	None...	1,500	15	Scheb....	Circ-spl...	Cone....	Selec....	Amid.....	3	.....	Dbl chn...	.....	½-Ell....	½-Ell....	Right...	Right...	R-r.....	McIntyre, E
Suct....	Motor...	1,500	12	Strom....	Circ-spl...	Dry-d...	Selec....	Unit-m....	3	.....	Dbl chn...	.....	½-Ell....	½-Ell....	Right...	Cent....	R-r.....	McIntyre, A
Suct....	Motor...	1,500	6	Strom....	Circ-spl...	Dry-d...	Selec....	Unit-m....	3	.....	Dbl chn...	.....	½-Ell....	½-Ell....	Right...	Cent....	R-r.....	McIntyre, G
L-b.....	Gearset..	1,150	15	Ray.....	Circ-spl...	Exp-s...	Prog.....	Unit-m....	3	.....	Int-g.....	Tor-t...	½ Ell....	½-Ell....	Left....	Left....	R-r.....	Mais, C
L-b.....	Gearset..	1,150	15	Ray.....	Circ-spl...	Exp-s...	Prog.....	Unit-m....	3	.....	Int-g.....	Tor-t...	½-Ell....	½-Ell....	Left....	Left....	R-r.....	Mais, D
L-b.....	Gearset..	1,150	15	Ray.....	Circ-spl...	Exp-s...	Prog.....	Unit-m....	3	.....	Int-g.....	Tor-t...	½-Ell....	½-Ell....	Left....	Left....	R-r.....	Mais, E
L-b.....	Gearset..	1,150	15	Ray.....	Circ-spl...	Exp-s...	Prog.....	Unit-m....	3	.....	Int-g.....	Tor-t...	½-Ell....	½-Ell....	Left....	Left....	R-r.....	Mais, F
L-b.....	Gearset..	1,250	12	Ray.....	Circ-spl...	Exp-s...	Prog.....	Unit-m....	3	.....	Int-g.....	Tor-t...	½-Ell....	½-Ell....	Left....	Left....	R-r.....	Mais, G
L-b.....	Gearset..	1,250	12	Ray.....	Circ-spl...	Exp-s...	Prog.....	Unit-m....	3	.....	Int-g.....	Tor-t...	½-Ell....	½-Ell....	Left....	Left....	R-r.....	Mais, H
L-b.....	Gearset..	.....	.....	Ray.....	Circ-spl...	Exp-s...	Prog.....	Unit-m....	3	.....	Int-g.....	Tor-t...	½-Ell....	½-Ell....	Left....	Left....	R-r.....	Mais, Tractor
None...	None...	.....	.....	Strom....	Pressure...	Dry-d...	Selec....	Unit-m....	3	6¼–1	Dbl chn...	.....	½-Ell....	½-Ell....	Left....	Cent....	R-r.....	Martin, R
None...	None...	.....	.....	Strom....	Pressure...	Wet-d...	Selec....	Unit-j.....	3	9 –1	Dbl chn...	.....	½-Ell....	½-Ell....	Right...	Right...	R-r.....	Martin, S
Cent...	Motor...	1,000	13½	Strom....	Pressure...	Wet-d...	Selec....	Unit-j.....	3	9 –1	Dbl chn...	.....	½-Ell....	½-Ell....	Right...	Right...	R-r.....	Martin, E
Cent...	Motor...	1,000	13	Strom....	Pressure...	Wet-d...	Selec....	Unit-j.....	3	9½–1	Dbl chn...	.....	½-Ell....	½-Ell....	Right...	Right...	R-r.....	Martin, L
Cent...	Motor...	1,400	20	Strom....	Spl-press..	Wet-d...	Selec....	Unit-m....	3	5⅛–1	Bevel.....	Tor-t...	½-Ell....	Plat.....	Right...	Cent....	R-r.....	Menominee, A3
Cent...	F-wheel.	1,200	16	Strom....	Spl-press..	Dry-d...	Selec....	Unit-m....	3	7 –1	Doub-r....	T-arm...	½-Ell....	Plat.....	Right...	Cent....	R-r.....	Menominee, B3
Cent...	F-wheel.	1,400	14	Strom....	Spl-press..	Dry-p...	Selec....	Unit-m....	3	.....	Doub-r....	T-arm...	½-Ell....	Plat.....	Right...	Cent....	R-r.....	Menominee, C
.....	.....	1,000	15	Own.....	Spl-press..	Wet-d...	Plan.....	Unit-m....	2	8 –1	Dbl chn...	.....	Ellip....	Ellip....	Right...	Right...	R-r.....	Mercury, P
Cent...	Motor...	1,200	18	Scheb....	Spl-press..	Dry-d...	Selec....	Unit-m....	3	6¾–1	Top worm.	Springs..	½-Ell....	½-Ell....	Left....	Cent....	R-r.....	Modern, L
Cent...	Motor...	1,200	16	Scheb....	Spl-press..	Cone....	Selec....	Unit-j.....	3	9 –1	Dbl chn...	Blank...	½-Ell....	½-Ell....	Left....	Cent....	R-r.....	Modern, H
Cent...	Motor...	1,200	16	Scheb....	Spl-press..	Dry-d...	Selec....	Unit-m....	3	8 –1	Top worm.	Springs..	½-Ell....	½-Ell....	Left....	Cent....	R-r.....	Modern, M
.....	.....	.....	.....	Strom....	Circ-spl...	Cone....	Selec....	Amid.....	3	7 –1	Dbl chn...	.....	½-Ell....	½-Ell....	Left....	Cent....	R-r.....	Moon, B
Cent...	Motor...	1,000	18.11	Scheb....	Spl-press..	Cone....	Selec....	Unit-j.....	3	6¾–1	Dbl chn...	.....	½-Ell....	½-Ell....	Left....	Cent....	R-r.....	Moore, 1½
Cent...	Motor...	1,000	17.4	Scheb....	Spl-press..	Cone....	Selec....	Unit-j.....	3	6½–1	Dbl chn...	.....	½-Ell....	½-Ell....	Left....	Cent....	R-r.....	Moore, 2
Cent...	Motor...	1,000	14	Scheb....	Spl-press..	Cone....	Selec....	Unit-j.....	3	6½–1	Dbl chn...	.....	½-Ell....	½-Ell....	Right...	Right...	R-r.....	Moore, 3
Cent...	Motor...	1,000	12	Scheb....	Spl-press..	Cone....	Selec....	Unit-j.....	3	8½–1	Dbl chn...	.....	½-Ell....	½-Ell....	Right...	Right...	R-r.....	Moore, 4
Cent...	Motor...	950	10	Scheb....	Spl-press..	Cone....	Selec....	Unit-j.....	4	9½–1	Dbl chn...	.....	½-Ell....	½-Ell....	Right...	Right...	R-r.....	Moore, 5
.....	.....	1,500	20	Master....	Circ-spl...	Dry-d...	Selec....	Unit-m....	3	6 –1	Top worm.	R-r.....	½-Ell....	½-Ell....	Right...	Cent....	R-r.....	Moreland, 7X
.....	.....	1,500	18	Master....	Circ-spl...	Dry-d...	Selec....	Unit-m....	3	6½–1	Top worm.	R-r.....	½-Ell....	½-Ell....	Right...	Cent....	R-r.....	Moreland, 1X
Cent...	Motor...	1,100	15	Master....	Circ-spl...	Dry-d...	Selec....	Unit-m....	3	6½–1	Top worm.	Springs..	½-Ell....	½-Ell....	Right...	Cent....	R-r.....	Moreland, 2X
Cent...	Motor...	950	12	Master....	Circ-spl...	Dry-d...	Selec....	Amid.....	4	10½–1	Top worm.	Springs..	½-Ell....	½-Ell....	Right...	Cent....	R-r.....	Moreland, 3X
Cent...	Motor...	950	10	Master....	Circ-spl...	Dry-d...	Selec....	Unit-j.....	4	12 –1	Dbl chn...	.....	½-Ell....	½-Ell....	Right...	Right...	R-r.....	Moreland, 5X
Cent...	Motor...	900	8	Master....	Pressure...	Cont-b..	Selec....	Unit-j.....	4	12 –1	Dbl chn...	.....	½-Ell....	½-Ell....	Right...	Right...	R-r.....	Moreland, 6X
.....	.....	1,400	28	.....	Splash....	None...	Fric.....	Amid.....	Any	.....	Sing chn...	.....	½-Ell....	½-Ell....	Left....	Cent....	R-r.....	Motokart, 1&2
None...	None...	1,100	15	Zenith....	Pressure...	Cone....	Selec....	Unit-j.....	3	6½–1	Dbl chn†	.....	½-Ell....	½-Ell....	Left....	Cent....	R-r.....	Natco, 20
Cent...	Motor...	950	17	Ray.....	Circ-spl...	Dry-d...	Selec....	Unit-m....	3	6¾–1	Top worm.	Springs..	½-Ell....	½-Ell....	Right...	Cent....	Springs.	Nelson&LeM., E1
Cent...	Motor...	950	15	Ray.....	Circ-spl...	Dry-d...	Selec....	Unit-m....	3	6½–1	Top worm.	Springs..	½-Ell....	½-Ell....	Right...	Cent....	Springs.	Nelson&LeM., E1½
Cent...	Motor...	950	15	Ray.....	Circ-spl...	Dry-d...	Selec....	Unit-m....	3	7¾–1	Top worm.	Springs..	½-Ell....	½-Ell....	Right...	Cent....	Springs.	Nelson&LeM., E2
Cent...	D-shft..	.....	15	Zenith....	Circ-spl...	Dry-d...	Selec....	Unit-m....	3	7¾–1	Top worm.	Springs..	½-Ell....	½-Ell....	Left....	Cent....	Springs.	Natco, C
Hyd....	Motor...	1,000	18	Strom....	Spl-press..	Cone....	Selec....	Unit-j.....	3	3½–1	Dbl chn...	.....	½-Ell....	½-Ell....	Right...	Right...	R-r.....	New York, L
.....	.....	.....	.....	Strom....	Circ-spl...	Cone....	Selec....	Unit-m....	3	5 –1	Bevel.....	R-r.....	½-Ell....	Ellip....	Left....	Cent....	R-r.....	O. K., C&D
Cent...	Motor...	1,265	16	Holley....	Spl-press..	Cone....	Selec....	Unit-m....	3	7¾–1	Top worm.	Springs.	½-Ell....	½-Ell....	Left....	Left....	Springs.	Old Hickory, 30W
.....	.....	1,600	16	Carter....	Spl-press..	Dry-d...	Selec....	Unit-m....	3	7½–1	Top worm.	Springs.	½-Ell....	½-Ell....	Right...	Cent....	Springs.	Old Reliable, 1½
.....	.....	1,400	15	Strom....	Spl-press..	Wet-d...	Selec....	Unit-j.....	3	6½–1	Dbl chn...	.....	½-Ell....	½-Ell....	Right...	Right...	R-r.....	Old Reliable, 2
.....	.....	1,400	14	Strom....	Spl-press..	Wet-d...	Selec....	Unit-j.....	3	7½–1	Dbl chn...	.....	½-Ell....	½-Ell....	Right...	Right...	R-r.....	Old Reliable, 3
Cent...	D-shft...	1,400	14	Strom....	Spl-press..	Wet-d...	Selec....	Unit-j.....	3	7¾–1	Dbl chn...	.....	½-Ell....	½-Ell....	Right...	Right...	R-r.....	Old Reliable, 4
Cent...	D-shft...	1,400	12	Strom....	Spl-press..	Wet-d...	Selec....	Unit-j.....	3	8½–1	Dbl chn...	.....	½-Ell....	½-Ell....	Right...	Right...	R-r.....	Old Reliable, 5
Cent...	D-shft...	1,000	10	Carter....	Spl-press..	Wet-d...	Selec....	Unit-j.....	3	8½–1	Dbl chn...	.....	½-Ell....	½-Ell....	Right...	Right...	R-r.....	Old Reliable, 7
.....	.....	.....	.....	Scheb....	Circ-spl...	Cone....	Selec....	Unit-x....	3	3¾–1	Bevel.....	Tor-t...	½-Ell....	¾-Ell....	Left....	Cent....	Tor-t...	Overland, 81
Cent...	Motor...	1,000	14	Own.....	Splash....	Dry-p...	Prog.....	Unit-j.....	3	8½–1	Dbl chn...	.....	½-Ell....	½-Ell....	Right...	Right...	R-r.....	Packard, 2
Cent...	Motor...	1,000	12	Own.....	Splash....	Dry-p...	Prog.....	Unit-j.....	3	11 –1	Dbl chn...	.....	½-Ell....	½-Ell....	Right...	Right...	R-r.....	Packard, 3
Cent...	Motor...	1,000	12	Own.....	Splash....	Dry-p...	Prog.....	Unit-j.....	3	12 –1	Dbl chn...	.....	½-Ell....	½-Ell....	Right...	Right...	R-r.....	Packard, 4
Cent...	Motor...	1,000	8½	Own.....	Splash....	Dry-p...	Prog.....	Unit-j.....	3	11½–1	Dbl chn...	.....	½-Ell....	½-Ell....	Right...	Right...	R-r.....	Packard, 5
Cent...	Motor...	1,000	8½	Own.....	Splash....	Dry-p...	Prog.....	Unit-j.....	3	11½–1	Dbl chn...	.....	½-Ell....	½-Ell....	Right...	Right...	R-r.....	Packard, 6
.....	.....	1,400	20	Own.....	Fuel-inj...	Dry-d...	Selec....	Unit-j.....	3	6½–1	Dbl chn...	.....	½-Ell....	½-Ell....	Right...	Cent....	R-r.....	Palmer-Moore, D
.....	.....	1,500	25	Zephyr....	Circ-spl...	Cone....	Selec....	Unit-m....	3	.....	Bevel.....	Tor-t...	½-Ell....	½-Ell....	Right...	Cent....	Tor-t...	Paulding, O

Carbureter Make, Strom, *Stromberg;* Scheb, *Schebler;* Ray, *Rayfield;* Excel, *Excelsior;* King, *Kingston;* B-Z, *Breeze-Zephyr.* **Lubrication,** Splash, *non-circulating or simple splash;* Circ-spl, *circulating-splash;* Spl-press, *splash-pressure;* Fuel-in, *fuel injection, oil mixed with fuel;* Pressure, *pressure feed, no splash.* **Clutch Type,** Dry-p, *dry plate;* Dry-d, *dry multiple disk;* Wet-d, *wet disk or disk-in-oil;* R-cone, *reversed cone or inverted cone;* Exp-s, *expanding shoe;* Cont-b, *contracting band.* **Gearset Type,** Prog, *progressive sliding gear;* Selec, *selective sliding gear;* Plan, *planetary;* Ind-c, *constant-mesh individual-clutch;* Fric, *friction;* Hyd, *hydraulic;* Elec, *electric.* **Gearset Location,** mid, *amidships;* Unit-m, *unit with motor;* Unit-j, *unit with jackshaft;* Unit-x, *unit with axle;* Unit-s, *unit driveshaft.* **Final Drive,** Bevel, *direct bevel;* Doub-r, *double-reduction, bevel and spur;* Int-g, *internal gear;* Top worm, *worm gear with worm on top;* Dbl chn, *double chain;* Sing chn, *single chain;* -f, *to front wheels;* -4, *to all four wheels.* **Driving Torque,** R-r, *radius rods;* T-arm, *torque-arm;* Tor-t, *torsion tube;* Sub-f, *sub-frame.* **Springs,** Ellip, *elliptic;* ½-Ell, *half-elliptic;* ¼-Ell, *quarter-elliptic;* ¾-Ell, *three-quarters-elliptic;* Plat, *platform;* T-ell, *transverse elliptic;* Cant, *cantilever;* Comb, *combination of half-elliptic and elliptic on double frames.* **Steering,** Cent, *center.* **Levers,** Cent, *center;* C&r, *gearshift center, brake right;* C&l, *gearshift center, brake left;* St-col, *steering column.* **Propulsion,** R-r, *radius rods;* T-arm, *torque arm;* Tor-t, *torsion tube;* Sub-f, *sub-frame.*

Complete Specifications of 1915 American Commercial Vehicles,

Name and Model	Load Capacity in Pounds	Price of Chassis	Wheelbase in Inches	TIRES			MOTOR												
				Kind	SIZES IN INCHES		Location	CYLINDERS			S.A.E. H.P.	Cylinders Cast	Valves Placed	COOLING		IGNITION		
					Front	Rear		No.	Bore in Ins.	Stroke in Ins.				Water Circulation	Radiator Type	Type	Make	Spark Advance
Paulding, H	1,500	950	120	Solid	36x2½	36x3*	Under hood	4	3.50	5.00	19.61	Block	R&H	Thermo	Finned	Dual	Day-D	Hand
Paulding, G	2,000	1,300	120	Solid	36x3	36x3½	Under hood	4	4.00	5.25	25.60	Block	R&H	Thermo	Finned	Dual	Day-D	Hand
Paulding, M	4,000	1,950	145	Solid	36x4	36x4d	Under hood	4	4.62	5.25	34.28	Block	R&H	Gear	Finned	Dual	Day-D	Hand
Peerless, 3	6,000	3,700	151*	Solid	36x5	40x5d	Under hood	4	4.50	6.50	32.40	Pairs	Opp	Cent	Finned	Dual	Bosch	Hand
Peerless, 4	8,000	4,000	151*	Solid	36x5	40x5d	Under hood	4	4.50	6.50	32.40	Pairs	Opp	Cent	Finned	Dual	Bosch	Hand
Peerless, 5	10,000	4,500	151*	Solid	36x6	42x6d	Under hood	4	4.50	6.50	32.40	Pairs	Opp	Cent	Finned	Dual	Bosch	Hand
Peerless, 6	12,000	5,000	151*	Solid	36x6	42x7d	Under hood	4	4.50	6.50	32.40	Pairs	Opp	Cent	Finned	Dual	Bosch	Hand
Pierce-Arrow, 2	4,000	3,000	150*	Solid	36x4	36x4d	Under hood	[illegible]4	4.00	5.50	25.60	Pairs	Opp	Cent	Finned	Sing	Bosch	Hand
Pierce-Arrow, 5	10,000	4,500	168*	Solid	36x5	40x6d	Under hood	4	4.87	6.00	38.25	Pairs	Opp	Cent	Finned	Dual	Bosch	Hand
Reo, J	4,000	1,650	130*	Solid	36x4	36x3½d	Under hood	4	4.12	4.50	27.20	Pairs	R&H	Cent	Finned	Dual	Nat'l	Hand
Republic, 1500	1,500	.....	124	Solid*	35x3*	35x3½*	Under hood	4	3.50	5.00	19.61	Block	Right	Thermo	Finned	Sing	Bosch	Fixed
Republic, 1	2,000	1,350	124	Solid	35x3	35x4	Under hood	4	3.75	5.25	22.50	Block	Left	Cent	Finned	Sing	Eisemann	Fixed
Republic, 1½	3,000	1,475	144	Solid	35x3½	35x5*	Under hood	4	3.75	5.25	22.50	Block	Left	Cent	Finned	Sing	Eisemann	Fixed
Roland, 1	2,000	2,000	120	Solid	34x3½	36x4	Under hood	4	3.75	5.25	22.50	Block	Right	Cent	Finned	Sing	Eisemann	Fixed
Roland, 3	6,000	3,500	144	Solid	36x5	36x5d	Under hood	4	4.25	6.75	29.00	Pairs	Right	Cent	Finned	Dual	Eisemann	Auto
Roland, 3½	7,000	3,500	156	Solid	36x5	40x5d	Under hood	4	4.50	6.75	32.40	Pairs	Right	Cent	Finned	Dual	Eisemann	Auto
Rowe, CW	3,000	2,450	144	Solid	34x3½	36x3d	Under hood	4	4.00	5.00	25.60	Block	.....	Thermo	Sq-t	Dual	Bosch	Hand
Rowe, DW	4,000	2,800	150	Solid	36x4	36x4d	Under hood	4	4.25	5.00	29.00	Pairs	.....	Cent	Sq-t	Dual	Bosch	Hand
Rowe, EW	6,000	3,400	156	Solid	36x5	40x5d	Under hood	4	4.00	5.50	25.60	Pairs	.....	Cent	Sq-t	Dual	Bosch	Hand
Rowe, GW	10,000	4,500	171	Solid	36x6	40x6d	Under hood	4	4.75	5.50	36.15	Pairs	.....	Cent	Sq-t	Dual	Bosch	Hand
Royal, B3½	7,000	3,400	132	Solid	36x5	40x5d	Under floor	4	4.75	5.50	36.15	Pairs	Opp	Cent	Cell	Dual	Bosch	Fixed
Royal, A5	10,000	4,500	138	Solid	36x6	40x6d	Under floor	4	4.75	5.50	36.15	Pairs	Opp	Cent	Cell	Dual	Bosch	Fixed
Sandow, 1½	3,000	1,900	125*	Solid	36x3	36x4	Under hood	4	3.75	5.25	22.50	Block	L&H	Gear	Cell	Sing	Bosch	2-pt
Sandow, 2	4,000	2,250	125*	Solid	36x4	36x4d	Under hood	4	4.12	5.25	27.20	Block	L&H	Gear	Cell	Sing	Bosch	2-pt
Sandow, 3	6,000	3,000	147*	Solid	36x5	36x5d	Under hood	4	4.50	5.50	32.40	Pairs	L&H	Gear	Cell	Dual	Bosch	2-pt
Sanford, O	1,500	1,290	120	Solid*	36x3*	36x3½*	Under hood	4	3.50	5.12	19.61	Block	Right	Thermo	Finned	Sing	Split	Fixed
Sanford, K	3,000	1,660	106	Solid	36x3½	36x3½	Under floor	4	4.00	4.50	25.60	Pairs	Left	Cent	Sq-t	Dual	Bosch	Hand
Sanford, L	4,000	1,910	118	Solid	36x3½	36x4	Under floor	4	4.12	5.00	27.20	Pairs	Left	Cent	Sq-t	Dual	Bosch	Hand
Sanford, M	4,000	1,910	140	Solid	36x3½	36x5	Under hood	4	4.12	5.00	27.20	Pairs	Left	Cent	Finned	Dual	Bosch	Hand
Saxon, A2	400	395-c	96	Pneu	28x3	28x3	Under hood	4	2.62	4.00	11.23	Block	Left	Thermo	Cell	Sing	Atw-K	Auto
Selden, JB	3,000	2,000	150	Solid	36x3½	36x5	Under hood	4	3.75	5.25	22.50	Block	Left	Cent	Finned	Sing	Bosch	Fixed
Service, W	2,000	2,000	135*	Solid	36x3½	36x5	Under hood	4	3.75	5.50	22.50	Block	Right	Cent	Finned	Sing	Eisemann	Fixed
Service, Q	3,000	1,975	150	Solid	36x3½	36x5	Under hood	4	4.12	5.50	27.20	Block	Right	Cent	Cell	Sing	Eisemann	Hand
Service, P	4,000	2,375	150	Solid	36x4	40x3½d	Under hood	4	4.12	5.50	27.20	Block	Right	Cent	Cell	Sing	Eisemann	Hand
Service, PW	4,000	2,500	160	Solid	36x4	36x4d	Under hood	4	4.12	5.50	27.20	Block	Right	Cent	Cell	Sing	Eisemann	Hand
Service, H	6,000	2,975	171	Solid	36x5	40x5d	Under hood	4	4.25	5.50	29.00	Block	Right	Cent	Cell	Sing	Eisemann	Hand
Service, HX	10,000	4,000	175*	Solid	36x6	40x6d	Under hood	4	4.75	6.75	36.15	Block	Right	Cent	Cell	Dual	Eisemann	Hand
Signal, D	2,000	1,400	120	Solid	34x3	36x4	Under hood	4	3.75	5.25	22.50	Block	Left	Cent	Finned	Sing	Eisemann	Fixed
Signal, DL	2,000	1,450	144	Solid	34x3	36x4	Under hood	4	3.75	5.25	22.50	Block	Left	Cent	Finned	Sing	Eisemann	Fixed
Signal, F	2,000	1,500	120	Solid	34x3	36x4	Under hood	4	3.75	5.25	22.50	Block	Left	Cent	Finned	Sing	Eisemann	Fixed
Signal, FL	2,000	1,550	144	Solid	34x3	36x4	Under hood	4	3.75	5.25	22.50	Block	Left	Cent	Finned	Sing	Eisemann	Fixed
Smith, A	7,000	3,750	168	Solid	36x5	36x5d	Under hood	4	5.00	5.75	40.00	Pairs	Opp	Cent	Finned	Doub	Eisemann	Hand
Smith, C	12,000	4,750	168	Solid	36x6	40x6d	Under hood	4	5.25	5.75	44.20	Pairs	Opp	Cent	Finned	Doub	Eisemann	Hand
South Bend, 40	4,000	2,000	136*	Pneu*	36x4½*	36x4½*	Under hood	4	4.00	5.00	25.60	Pairs	Opp	Cent	Sq-t	Dual	Bosch	Hand
South Bend, 80	8,000	3,000	152	Pneu*	39x6*	39x6*	Under hood	4	5.25	7.00	44.20	Pairs	Opp	Cent	Sq-t	Dual*	Bosch*	Hand
Speedwell, 8Y	4,000	2,850	115	Solid	36x4	36x3½d	Under floor	4	4.12	5.25	27.20	Block	Left	Cent	Sq-t	Sing	Eisemann	Auto
Speedwell, 10Z	8,000	3,750	115	Solid	36x5	36x5d	Under floor	4	5.00	5.00	40.00	Pairs	Left	Cent	Sq-t	Sing	Eisemann	Auto
Speedwell, 8X	12,000	4,400	139	Solid	36x6	36x6d	Under floor	4	5.00	5.00	40.00	Pairs	Left	Cent	Sq-t	Sing	Eisemann	Auto
Standard-D, 3	6,000	2,750	144	Solid	36x5	36x5d	Under hood	4	4.50	5.50	32.40	Pairs	Left	Cent	Cell	Sing	Eisemann	Fixed
Standard-D, 7	14,000	3,300	112	Solid	40x6	40x6d	Under hood	4	4.50	5.50	32.40	Pairs	Left	Cent	Cell	Sing	Eisemann	Fixed
Standard-O, DX	1,500	1,700	.....	Pneu	34x4½	34x4½	Under hood	4	4.00	4.50	25.60	Pairs	Right	Cent	Z-z-t	Sing	Eisemann	Hand
Standard-O, A	2,000	1,700	134	Solid*	36x4*	36x4	Under hood	4	4.00	4.50	25.60	Pairs	Right	Cent	Z-z-t	Sing	Eisemann	Fixed
Standard-O, AX	2,000	1,900	124*	Solid*	36x4*	36x4	Under hood	4	4.00	4.50	25.60	Pairs	Right	Cent	Z-z-t	Sing	Eisemann	Hand
Standard-O, B	3,000	1,800	134*	Solid*	37x4½*	36x4½	Under hood	4	4.00	4.50	25.60	Pairs	Right	Cent	Z-z-t	Sing	Eisemann	Fixed
Standard-O, BX	3,000	2,100	134*	Solid*	37x4½*	36x5	Under hood	4	4.00	4.50	25.60	Pairs	Right	Cent	Z-z-t	Sing	Eisemann	Fixed
Standard-O, C	4,000	2,000	144*	Solid*	37x5*	36x5*	Under hood	4	4.00	4.50	25.60	Pairs	Right	Cent	Z-z-t	Sing	Eisemann	Fixed
Standard-O, CX	7,000	3,200	162	Solid	36x5	36x5d	Under hood	4	4.37	6.00	30.65	Pairs	Right	Cent	Z-z-t	Sing	Eisemann	Hand
Stegeman	1,500	1,600	125	Pneu	34x4½	34x4½	Under hood	4	3.75	5.25	22.50	Block	Left	Cent	Sq-t	Sing	Eisemann	Auto
Stegeman	3,000	2,100	150	C&S	34x3½	36x5	Under hood	4	3.75	5.25	22.50	Block	Left	Cent	Sq-t	Sing	Eisemann	Auto
Stegeman	5,000	2,800	142*	Solid	34x3½	36x3½db	Under hood	4	4.25	5.25	29.00	Block	Left	Cent	Sq-t	Sing	Eisemann	Auto
Stegeman	7,000	3,350	155*	Solid	36x4	40x4db	Under hood	4	4.50	5.50	32.40	Pairs	Left	Cent	Sq-t	Sing	Eisemann	Auto
Stegeman	10,000	4,200	168	Solid	36x6	40x6db	Under hood	4	4.50	6.75	32.40	Pairs	Left	Cent	Sq-t	Sing	Eisemann	Auto
Sternberg	1,000	850-c	88	Pneu	30x4	30x4	Under hood	4	2.75	4.00	12.08	Block	Right	Thermo	Sq-t	Sing	Eisemann	Hand
Sternberg	4,000	2,800	148*	Solid	36x5	36x3½d*	Under hood	4	3.75	5.75	22.50	Pairs	Right	Cent	Cell	Sing	Eisemann	Auto
Sternberg	6,000	3,400	158*	Solid	36x6	36x4d*	Under hood	4	4.25	5.75	29.00	Pairs	Right	Cent	Cell	Sing	Eisemann	Auto
Sternberg	10,000	4,500	.....	Solid	38x6	40x6d	Under hood	4	4.50	5.75	32.40	Pairs	Right	Cent	Cell	Sing	Eisemann	Auto
Sternberg	12,000	4,650	144	Solid	38x6	42x6d	Under floor	4	4.75	6.75	36.15	Pairs	Right	Cent	Sq-t	Dual	Eisemann	Auto
Sternberg	14,000	4,750	144	Solid	38x7	42x7d	Under floor	4	4.75	6.75	36.15	Pairs	Right	Cent	Sq-t	Dual	Eisemann	Auto
Stewart B	1,500	1,500	124	Pneu	34x4½	34x4½	Under hood	4	3.50	5.00	19.61	Block	Right	Thermo	Cell	Sing	Bosch	Fixed
Stewart K, C	2,000	1,100	96	Solid	36x3	36x3	Under seat	2	5.00	5.50	20.00	Sing	Head	Cent	Finned	Dual	King	Hand
Studebaker, 5	1,500	985	108	Pneu	34x4½	34x4½	Under hood	4	3.50	5.00	19.61	Block	Left	Cent	Finned	Dual	.....	Hand
Sullivan, G	3,000	1,600	129	Solid	36x3	36x4	Under hood	4	3.75	4.50	22.50	Block	Right	Thermo	Finned	Sing	Bosch	Fixed
Tiffin, A	1,500	1,600	112	Solid	34x3	34x3	Under hood	4	3.75	4.50	22.50	Block	Right	Thermo	Finned	Sing	Bosch	Hand

ABBREVIATIONS: General, *, *with other options;* Opt, *optional.* **Price,** -c, *complete with body.* **Tires, Kind,** Pneu, *pneumatic;* Sol-st, *solid in front, steel in rear;* P&s, *pneumatic in front, solid in rear;* P&c, *pneumatic in front, cushion in rear;* C&s, *cushion in front, solid in rear.* **Tire Sizes,** d, *dual.* **Motor Location,** Betw seats, *between seats.* **Cylinder Cast,** Sing, *singly or individually.* **Location of Valves,** Opp, *opposite, or T-head type;* Top (2-cylinder motors, only), *L-head cylinder laid horizontal with valves up;* R&h, *at right and in head, L-head cylinder;* L&h, *at left and in head, L-head cylinder;* 2-cyc, *two-cycle motor, no valves;* Back, *L-head motor placed transversely with valves at rear.* **Water Circulation,** Cent, *centrifugal, pump;* Gear, *gear pump;* Thermo, *thermo-syphon circulation;* Air, *air-cooled, no water.* **Radiator Type,** Finned, *finned-tube;* Cell, *cellular or honeycomb;* Sq-t, *square-tube or flat-tube;* Z-z-t, *zig-zag-tube or crimped flat-tube.* **Ignition, Type,** Sing, *single;* Doub, *double;* Dual-d, *dual-double.* **Make of Magneto** (or other sparking devices), Split, *Splitdorf;* Conn, *Connecticut;* King, *Kingston;* West, *Westinghouse;* Day-D, *Dayton-Dick;* Atw-K, *Atwater-Kent.* **Spark Advance,** Auto, *automatic;* 2-pt, *two-point fixed, battery circuit fixed in retard, magneto in advance.* **Governor Type,** Cent, *centrifugal;* L-b, *loose-ball;* Suct, *suction;* Hyd, *hydraulic.* **Governor Drive,** Motor, *from motor;* D-shft, *from driving shaft;* F-wheel, *from front wheel;* Gearset, *from gearset countershaft;* Duplex, *from both the motor and the driving shaft, by overrunning clutches.*

Including Capacity, Motor Speed, Final Drive, Horsepower, Etc.

MOTOR						TRANSMISSION							SPRINGS		CONTROL			
GOVERNOR		SPEEDS					GEARSET											
Type	Drive	Motor in R.p.m.	Truck in M.p.h.	Carburetor Make	Lubrication	Clutch Type	Type	Location	Speeds	Total Gear-Ratio in High	Final Drive	Torque Taken By	Front	Rear	Steer	Levers	Propulsion Taken By	Name and Model
.....	.....	.....	.....	Scheb.....	Circ-spl...	Cone....	Selec....	Unit-m....	3	.....	Dbl chn..	.....	½-Ell....	½-Ell....	Right...	Cent....	R-r.....	Paulding, H
.....	.....	1,800	30	Scheb.....	Circ-spl...	Dry-d....	Selec....	Unit-m....	3	.....	Dbl chn..	.....	½-Ell....	Plat....	Right...	Cent....	R-r.....	Paulding, G
.....	.....	.....	.....	Scheb.....	Circ-spl...	Dry-d....	Selec....	.....	3	.....	Dbl chn..	.....	½-Ell....	Plat....	Right...	Cent....	R-r.....	Paulding, M
Cent....	Motor...	925	14½	Peerless...	Splash....	Cone....	Selec....	Amid.....	4	7½–1	Dbl chn..	.....	½-Ell....	½-Ell....	Right...	Right...	R-r.....	Peerless, 3
Cent....	Motor...	925	12½	Peerless...	Splash....	Cone....	Selec....	Amid.....	4	8½–1	Dbl chn..	.....	½-Ell....	½-Ell....	Right...	Right...	R-r.....	Peerless, 4
Cent....	Motor...	925	10½	Peerless...	Splash....	Cone....	Selec....	Amid.....	4	10½–1	Dbl chn..	.....	½-Ell....	½-Ell....	Right...	Right...	R-r.....	Peerless, 5
Cent....	Motor...	925	10	Peerless...	Splash....	Cone....	Selec....	Amid.....	4	10½–1	Dbl chn..	.....	½-Ell....	½-Ell....	Right...	Right...	R-r.....	Peerless, 6
Cent....	Motor...	1,050	16	Own.....	Pressure...	Cone....	Selec....	Amid.....	3	.....	Top worm.	T-arm...	½-Ell....	½-Ell....	Right...	Right...	R-r.....	Pierce-Arrow, 2
Cent....	Motor...	950	14	Own.....	Pressure...	Cone....	Selec....	Amid.....	3	.....	Top worm.	T-arm...	½-Ell....	½-Ell....	Right...	Right...	R-r.....	Pierce-Arrow, 5
Hyd....	Motor...	1,200	12	Holley....	Circ-spl...	Dry-d....	Selec....	Amid.....	3	8½–1	Dbl chn..	.....	½-Ell....	½-Ell....	Left....	Cent....	R-r.....	Reo, J
Suct....	Motor...	1,050	18	Strom.....	Spl-press..	Dry-d....	Selec....	Unit-m....	3	6½–1	Int-g.....	Springs..	½-Ell....	½-Ell....	Left....	Cent....	Springs..	Republic, 1500
Suct....	Motor...	1,000	15	Strom.....	Spl-press..	Cone....	Selec....	Unit-j....	3	7½–1	Dbl chn..	.....	½-Ell....	½-Ell....	Left....	Cent....	R-r.....	Republic, 1
Suct....	Motor...	1,000	15	Strom.....	Spl-press..	Cone....	Selec....	Unit-j....	3	7½–1	Dbl chn..	.....	½-Ell....	½-Ell....	Left....	Cent....	R-r.....	Republic, 1½
None...	None...	1,500	18	G&A.....	Circ-spl...	None...	Elec....	Amid.....	2	.....	Dbl chn..	.....	½-Ell....	½-Ell....	Left....	Left....	R-r.....	Roland, 1
Cent....	Motor...	900	12	G&A.....	Circ-spl...	None...	Elec....	Amid.....	2	.....	Top worm.	Springs..	Ellip....	Left....	Left....	Left....	Springs..	Roland, 3
Cent....	Motor...	900	12	G&A.....	Circ-spl...	None...	Elec....	Amid.....	2	.....	Dbl chn..	.....	½-Ell....	½-Ell....	Left....	Left....	R-r.....	Roland, 3½
.....	Motor...	.....	.....	Ray.....	Pressure...	Dry-d....	Selec....	.....	3	.....	Top worm.	Springs..	½-Ell....	½-Ell....	Right...	R&C....	.....	Rowe, CW
.....	Motor...	.....	.....	Ray.....	Pressure...	Dry-d....	Selec....	.....	3	.....	Top worm.	Springs..	½-Ell....	½-Ell....	Right...	R&C....	.....	Rowe, DW
.....	Motor...	.....	.....	Ray.....	Pressure...	Dry-d....	Selec....	.....	3	.....	Top worm.	Springs..	½-Ell....	½-Ell....	Right...	R&C....	.....	Rowe, EW
.....	.....	.....	.....	Ray.....	Pressure...	Wet-d....	.....	.....	3	.....	Top worm.	Springs..	½-Ell....	½-Ell....	Right...	R&C....	.....	Rowe, GW
L-b....	Motor...	900	15	Strom.....	Pressure...	Wet-d....	Ind-c....	Unit-j....	3	.....	Dbl chn..	.....	½-Ell....	½-Ell....	Right...	Right...	R-r.....	Royal, B3½
L-b....	Motor...	900	12	Strom.....	Pressure...	Wet-d....	Ind-c....	Unit-j....	3	.....	Dbl chn..	.....	½-Ell....	½-Ell....	Right...	Right...	R-r.....	Royal, A5
Cent....	Motor...	.....	.....	Strom.....	Circ-spl...	Dry-d....	Selec....	Unit-m....	3	.....	Dbl chn..	.....	½-Ell....	½-Ell....	Right...	Cent....	R-r.....	Sandow, 1½
Cent....	Motor...	.....	.....	Strom.....	Circ-spl...	Dry-d....	Selec....	Unit-m....	3	.....	Dbl chn..	.....	½-Ell....	½-Ell....	Right...	Cent....	R-r.....	Sandow, 2
Cent....	Motor...	.....	.....	Strom.....	Circ-spl...	Dry-d....	Selec....	Unit-m....	3	.....	Dbl chn..	.....	½-Ell....	½-Ell....	Right...	Cent....	R-r.....	Sandow, 3
.....	.....	1,100	18	Muir.....	Circ-spl...	Dry-d....	Selec....	Unit-m....	3	7 –1	Int-g.....	Springs..	½-Ell....	½-Ell....	Left....	Cent....	Springs..	Sanford, O
Cent....	.....	1,100	16	Scheb.....	Circ-spl...	Wet-d....	Selec....	Unit-m....	3	7 –1	Dbl chn..	.....	½-Ell....	½-Ell....	Right...	Right...	R-r.....	Sanford, K
Cent....	Motor...	1,100	14	Scheb.....	Circ-spl...	Wet-d....	Selec....	Unit-m....	3	7 –1	Dbl chn..	.....	½-Ell....	½-Ell....	Right...	Right...	R-r.....	Sanford, L
Cent....	Motor...	1,100	14	Scheb.....	Circ-spl...	Dry-d....	Selec....	Unit-m....	3	7 –1	Dbl chn..	.....	½-Ell....	½-Ell....	Left....	Cent....	R-r.....	Sanford, M
.....	.....	1,600	40	Mayer....	Splash....	Dry-p....	Prog.....	Unit-x....	2	4½–1	Bevel.....	Tor-t....	½-Ell....	½-Ell....	Left....	Cent....	Tor-t....	Saxon, A2
Cent*...	Motor...	1,150	16	Strom.....	Circ-spl...	Dry-d....	Selec....	Unit-m....	3	7½–1	Dbl chn..	.....	½-Ell....	½-Ell....	Left....	Cent....	R-r.....	Selden, JB
Cent*...	Motor...	1,000	16	Strom.....	Spl-press..	Cone....	Selec....	Amid.....	3	6½–1	Top worm.	Springs..	½-Ell....	½-Ell....	Left....	Cent....	Springs..	Service, W
Cent*...	Motor...	1,000	14	Strom.....	Spl-press..	Cone....	Selec....	Unit-j....	3	8 –1	Dbl chn..	.....	½-Ell....	½-Ell....	Left....	Cent....	R-r.....	Service, Q
Cent*...	Motor...	1,000	12	Strom.....	Spl-press..	Cone....	Selec....	Unit-j....	3	9 –1	Dbl chn..	.....	½-Ell....	½-Ell....	Left....	Cent....	R-r.....	Service, P
Cent*...	Motor...	1,000	14	Strom.....	Pressure...	Cone....	Selec....	Amid.....	3	7½–1	Top worm.	Springs..	½-Ell....	½-Ell....	Left....	Cent....	Springs..	Service, PW
Cent*...	Motor...	1,000	11	Strom.....	Spl-press..	Cone....	Selec....	Unit-j....	3	8½–1	Dbl chn..	.....	½-Ell....	½-Ell....	Left....	Cent....	R-r.....	Service, H
Cent....	Motor...	870	12	Strom.....	Spl-press..	Cone....	Selec....	Unit-j....	4	6½–1	Dbl chn..	.....	½-Ell....	½-Ell....	Right...	Right...	R-r.....	Service, HX
Suct....	Motor...	1,200	15	Strom.....	Circ-spl...	Cone....	Selec....	Unit-j....	3	7½–1	Dbl chn..	.....	½-Ell....	½-Ell....	Left....	Cent....	R-r.....	Signal,
Suct....	Motor...	1,200	15	Strom.....	Circ-spl...	Cone....	Selec....	Unit-j....	3	7½–1	Dbl chn..	.....	½-Ell....	½-Ell....	Left....	Cent....	R-r.....	Signal, DL
Suct....	Motor...	1,200	15	Strom.....	Circ-spl...	Dry d....	Selec....	Unit-m....	3	6½–1	Top worm.	Springs..	½ Ell....	½-Ell....	Left....	Cent....	Springs..	Signal, F
Suct....	Motor...	1,200	15	Strom.....	Circ-spl...	Dry-d....	Selec....	Unit-m....	3	6½–1	Top worm.	Springs..	½-Ell....	½-Ell....	Left....	Cent....	Springs..	Signal, FL
Suct....	Motor...	900	12	Strom.....	Circ-spl...	Dry-d....	Ind-c....	Unit-s....	3	8½–1	Top worm.	Tor-t....	½-Ell....	½-Ell....	Right...	Right...	Tor-t....	Smith, A
Suct....	Motor...	1,000	9	Strom.....	Circ-spl...	Dry-d....	Ind-c....	Unit-s....	3	8½–1	Top worm.	Tor-t....	½-Ell....	½-Ell....	Right...	Right...	Tor-t....	Smith, C
Suct....	F-wheel.	1,800	25	Strom.....	Spl-press..	Wet-d....	Selec....	Unit-j....	3	4 –1	Dbl chn..	.....	½-Ell....	½-Ell....	Opt.....	Opt.....	R-r.....	South Bend, 40
Suct....	F-wheel.	1,400	30	Strom.....	Spl-press..	Wet-d....	Selec....	Unit-j....	3*	4 –1	Dbl chn..	.....	½-Ell....	½-Ell....	Right...	R&C....	R-r.....	South Bend, 80
Cent....	Motor...	1,100	15	Scheb.....	Circ-spl...	Cone....	Selec....	Amid.....	3	9½–1	Dbl chn..	.....	½-Ell....	½-Ell....	Left....	Cent....	R-r.....	Speedwell, 8Y
Cent....	Motor...	1,200	12	Scheb.....	Circ-spl...	Cone....	Selec....	Amid.....	3	10½–1	Dbl chn..	.....	½-Ell....	½-Ell....	Left....	Cent....	R-r.....	Speedwell, 10Z
Cent....	Motor...	1,200	10	Scheb.....	Circ-spl...	Cone....	Selec....	Amid.....	3	10½–1	Dbl chn..	.....	½-Ell....	½-Ell....	Left....	Cent....	R-r.....	Speedwell, 8X
Suct....	Motor...	1,200	12	Strom.....	Circ-spl...	Dry-d....	Prog.....	Unit-m....	3	9 –1	T-worm*..	T-arm*..	½-Ell....	½-Ell....	Left....	Cent....	Springs*	Standard-D, 3
Suct....	Motor...	1,200	10	Strom.....	Circ-spl...	Dry-d....	Prog.....	Unit-m....	3	.....	Dbl chn..	.....	½-Ell....	½-Ell....	Left....	Cent....	R-r.....	Standard-D, 7
L-b....	Motor...	.....	.....	Strom.....	Circ-spl...	Dry-d....	Selec....	Amid.....	3	5½–1	Top worm.	Springs..	½-Ell....	½-Ell....	Right...	Cent....	Springs..	Standard-O, DX
L-b....	Motor...	1,250	18	Strom.....	Circ-spl...	Dry-d....	Selec....	Amid.....	3	.....	Dbl chn..	.....	½-Ell....	½-Ell....	Right...	Right...	R-r.....	Standard-O, A
L-b....	Motor...	1,250	18	Strom.....	Circ-spl...	Dry-d....	Selec....	Amid.....	3	6½–1	Top worm.	Springs..	½-Ell....	½-Ell....	Right...	Cent....	Springs..	Standard-O, AX
L-b....	Motor...	1,250	18	Strom.....	Circ-spl...	Dry-d....	Selec....	Amid.....	3	.....	Dbl chn..	.....	½-Ell....	½-Ell....	Right...	Right...	R-r.....	Standard-O, B
L-b....	Motor...	1,250	18	Strom.....	Circ-spl...	Dry-d....	Selec....	Amid.....	3	7½–1	Top worm.	Springs..	½-Ell....	½-Ell....	Right...	Cent....	Springs..	Standard-O, BX
L-b....	Motor...	1,250	18	Strom.....	Circ-spl...	Dry-d....	Selec....	Amid.....	3	.....	Dbl chn..	.....	½-Ell....	½-Ell....	Right...	Right...	R-r.....	Standard-O, C
L-b....	Motor...	1,000	14	Scheb.....	Circ-spl...	Dry-d....	Selec....	Amid.....	3	8⅝–1	Top worm.	Springs..	½-Ell....	½-Ell....	Right...	Cent....	Springs..	Standard-O, CX
Cent....	Motor...	1,100	20	Carter....	Spl-press..	Dry-d....	Selec....	Unit-m....	3	6 –1	Bevel.....	R-r.....	½-Ell....	½-Ell....	Left....	Cent....	R-r.....	Stegeman
Cent....	Motor...	1,100	18	Carter....	Spl-press..	Dry-d....	Selec....	Unit-m....	3	8 –1	Dbl chn..	.....	½-Ell....	½-Ell....	Left....	Cent....	R-r.....	Stegeman
Cent....	Motor...	1,100	15	Carter....	Spl-press..	Dry-d....	Selec....	Unit-m....	3	8½–1	Dbl chn..	.....	½-Ell....	½-Ell....	Left....	Cent....	R-r.....	Stegeman
Cent....	Motor...	1,100	12	Carter....	Spl-press..	Dry-d....	Selec....	Unit-m....	3	11⅝–1	Dbl chn..	.....	½-Ell....	½-Ell....	Left....	Cent....	R-r.....	Stegeman
Cent....	Motor...	1,100	10	Carter....	Spl-press..	Dry-d....	Selec....	Unit-m....	3	14½–1	Dbl chn..	.....	½-Ell....	½-Ell....	Left....	Cent....	R-r.....	Stegeman
None...	None...	1,500	19	.....	Spl-press..	Cone....	Selec....	Unit-m....	3	.....	Top worm.	Springs..	½-Ell....	½-Ell....	Left....	Cent....	Springs..	Sternberg
Cent....	Motor...	1,020	14	Holley....	Circ-spl...	Dry-p....	Ind-c....	Unit-m....	3	.....	Top worm.	Springs..	½-Ell....	½-Ell....	Left....	Cent....	Springs..	Sternberg
Cent....	Motor...	1,020	13	Holley....	Circ-spl...	Dry-p....	Ind-c....	Unit-m....	3	.....	Top worm.	Springs..	½-Ell....	½-Ell....	Left....	Cent....	Springs..	Sternberg
Cent....	Motor...	1,000	11	Holley....	Circ-spl...	Dry-p....	Ind-c....	Unit-m....	3	.....	Top worm.	Springs..	½-Ell....	½-Ell....	Left....	Cent....	Springs..	Sternberg
Cent....	Motor...	950	10	Holley....	Circ-spl...	Wet-d....	Ind-c....	Amid.....	3	.....	Dbl chn..	.....	½-Ell....	½-Ell....	Right...	Right...	R-r.....	Sternberg
Cent....	Motor...	950	10	Holley....	Circ-spl...	Wet-d....	Ind-c....	Amid.....	3	.....	Dbl chn..	.....	½-Ell....	½-Ell....	Right...	Right...	R-r.....	Sternberg
Cent....	Motor...	.....	30	Zenith....	Circ-spl...	Dry-d....	Selec....	Unit-m....	3	5½–1	Bevel.....	T-arm...	½-Ell....	½-Ell....	Left....	Cent....	Springs..	Stewart B
.....	.....	600	18	Scheb.....	Spl-press..	Wet-d....	Plan.....	Unit-m....	2	.....	Dbl chn..	.....	½-Ell....	½-Ell....	Left....	.....	R-r.....	Stewart K, C
.....	.....	.....	20	Scheb.....	Circ-spl...	Cone....	Selec....	Unit-x....	3	4½–1	Bevel.....	T-arm...	½-Ell....	Ellip....	Left*...	Cent*...	R-r.....	Studebaker, 5
Cent....	Motor...	1,350	18	Holley....	Circ-spl...	Cone....	Selec....	Unit-j....	3	7½–1	Dbl chn..	.....	½-Ell....	Plat....	Left....	Cent....	R-r.....	Sullivan, G
None...	None...	.....	.....	Breeze....	Circ-spl...	Cone....	Selec....	Unit-j....	3	6½–1	Dbl chn..	.....	½-Ell....	½-Ell....	Left....	Cent....	R-r.....	Tiffin, A

Carbureter Make, Strom, *Stromberg;* Scheb, *Schebler;* Ray, *Rayfield;* Excel, *Excelsior;* King, *Kingston;* B-Z, *Breeze-Zephyr.* **Lubrication,** Splash, *non-circulating or simple splash;* Circ-spl, *circulating-splash;* Spl-press, *splash-pressure;* Fuel-inj, *fuel injection, oil mixed with fuel;* Pressure, *pressure feed, no splash.* **Clutch Type,** Dry-p, *dry plate;* Dry-d, *dry multiple disk;* Wet-d, *wet disk or disk-in-oil;* R-cone, *reversed cone or inverted cone;* Exp-s, *expanding shoe;* Cont-b, *contracting band.* **Gearset Type,** Prog, *progressive sliding gear;* Selec, *selective sliding gear;* Plan, *planetary;* Ind-c, *constant-mesh individual-clutch;* Fric, *friction;* Hyd, *hydraulic;* Elec, *electric.* **Gearset Location,** Amid, *amidships;* Unit-m, *unit with motor;* Unit-j, *unit with jackshaft;* Unit-x, *unit with axle;* Unit-s, *unit driveshaft.* **Final Drive,** Bevel, *direct bevel;* Doub-r, *double-reduction, bevel and spur;* Int-g, *internal gear;* Top worm, *worm gear with worm on top;* Dbl chn, *double chain;* Sing chn, *single chain;* -f, *to front wheels;* -4, *to all four wheels.* **Driving Torque,** R-r, *radius rods;* T-arm, *torque-arm;* Tor-t, *torsion tube;* Sub-f, *sub-frame.* **Springs,** Ellip, *elliptic;* ½-Ell, *half-elliptic;* ¼-Ell, *quarter-elliptic;* ¾-Ell, *three-quarters-elliptic;* Plat, *platform;* T-ell, *transverse elliptic;* Cant, *cantilever;* Comb, *combination of half-elliptic and elliptic; on double frames.* **Steering,** Cent, *center.* **Levers,** Cent, *center;* C&r, *gearshift center, brake right;* C&l, *gearshift center, brake left;* St-col, *steering column.* **Propulsion,** R-r, *radius rods;* T-arm, *torque arm;* Tor-t, *torsion tube;* Sub-f, *sub-frame.*

Complete Specifications of 1915 American Commercial Vehicles,

Name and Model	Load Capacity in Pounds	Price of Chassis	Wheelbase in Inches	TIRES			MOTOR												
				Kind	SIZES IN INCHES		Location	CYLINDERS			S.A.E. H.P.	Cylinders Cast	Valves Placed	COOLING		IGNITION		
					Front	Rear		No.	Bore in Ins.	Stroke in Ins.				Water Circulation	Radiator Type	Type	Make	Spark Advance
Tiffin, G	2,000	2,000	128	Solid	36x3½	36x4	Under hood	4	3.75	4.25	22.50	Block	Left	Cent	Finned	Sing	Bosch	Hand
Tiffin, M	4,000	2,700	140	Solid	36x4	36x3½d	Under hood	4	4.12	5.25	27.20	Block	Left	Cent	Finned	Sing	Bosch	Hand
Trabold, T	2,000	1,250	118	Solid	36x3	38x3½	Under hood	4	3.50	5.00	19.61	Block	Right	Cent	Cell	Dual	Briggs	Hand
Trabold	4,000	2,450	130	Solid	36x4	38x3d	Under hood	4	4.12	5.50	27.20	Block	Right	Cent	Cell	Dual	West	Hand
Trabold	6,000	3,300	130	Solid	36x4	38x4d	Under hood	4	4.25	5.50	29.00	Block	Right	Cent	Cell	Dual	West	Hand
Trumbull, 15D	500	395-c	80	Pneu	28x3	28x3	Under hood	4	2.87	4.00	13.37	Block	Right	Thermo	Finned	Sing	Split	Fixed
Universal, C	3,000	1,950	132	Solid	34x3½	34x5	Under hood	4	3.75	5.25	22.50	Block	Right	Thermo	Finned	Sing	Eisemann	Hand
Universal, A	6,000	3,400	132	Solid	36x5	36x4d	Under floor	4	4.00	5.50	25.60	Pairs	Opp	Cent	Cell	Dual	Eisemann	Hand
U. S., E	4,000	2,550	132	Solid	34x3½	36x3½d	Under hood	4	4.12	5.25	27.20	Block	Left	Cent	Sq-t	Dual	Bosch	Hand
U. S., G	5,000	2,750	138	Solid	34x4	36x4d	Under hood	4	4.12	5.25	27.20	Block	Left	Cent	Sq-t	Dual	Bosch	Hand
U. S., D	6,000	3,200	144	Solid	34x5	36x5d	Under hood	4	4.50	5.50	32.40	Pairs	Left	Cent	Sq-t	Dual	Bosch	Hand
U. S., F	8,000	3,550	156	Solid	34x5	36x5d	Under hood	4	4.50	5.50	32.40	Pairs	Left	Cent	Sq-t	Dual	Bosch	Hand
Velie, X	2,000	2,000	129*	Solid*	36x3½*	36x4	Under hood	4	4.62	5.25	34.28	Pairs	Left	Cent	Cell	Dual	Bosch	Fixed
Velie, U	3,000	2,250	140	Solid	36x4	36x5*	Under hood	4	4.62	5.25	34.28	Pairs	Left	Cent	Sq-t	Dual	Bosch	Fixed
Velie	5,000	2,850	148*	Solid	36x4	36x4d	Under hood	4	4.50	5.50	32.40	Pairs	Left	Cent	Sq-t	Dual	Bosch	Fixed
Velie, Z	8,000	3,350	148*	Solid	36x5	40x5d	Under hood	4	4.50	5.50	32.40	Pairs	Left	Cent	Cell	Dual	Bosch	Fixed
Velie, Z5	10,000	3,750	148*	Solid	36x6	40x6d	Under hood	4	4.50	5.50	32.40	Pairs	Left	Cent	Cell	Dual	Bosch	Fixed
Vim, L&F	1,000	620	94	Pneu	30x3½	30x3½	Under hood	4	3.00	4.50	14.40	Block	Right	Thermo	Finned	Sing	Atw-K	Hand
Vulcan, 2	5,000	2,750	150*	Solid	36x4	30x3½d	Under hood	4	4.33	5.50	29.99	Pairs	Left	Thermo	Cell	Dual-d	Bosch	Hand
Vulcan, 3	7,500	3,250	156*	Solid	36x5	34x4d	Under hood	4	4.33	5.50	29.99	Pairs	Left	Thermo	Cell	Dual-d	Bosch	Hand
Vulcan, 4	9,200	4,000	162	Solid	35x5	35x5d	Under hood	4	4.33	5.50	29.99	Pairs	Left	Thermo	Cell	Dual-d	Bosch	Hand
Vulcan, 5	11,500	4,500	162	Solid	36x6	36x6d	Under hood	4	4.33	5.50	29.99	Pairs	Left	Thermo	Cell	Dual-d	Bosch	Hand
Vulcan, 7	15,500	6,000	156*	Solid	36x7	42x7d	Under hood	4	4.75	5.50	36.15	Pairs	Left	Gear	Cell	Dual-d	Bosch	Hand
Wagenhals	800	690-c	80	P&C	30x3	34x4½	Under hood	4	3.50	3.37	19.61	Pairs	Back	Gear	Finned	Dual		Hand
Walter, 5	10,000	4,500	144	Solid	40x6	40x5d	Under hood	4	4.37	6.00	30.65	Block	Right	Cent	Finned	Dual	Eisemann	Auto
Walter, 6	12,000	4,750	144	Solid	40x6	40x5d	Under hood	4	4.37	6.00	30.65	Block	Right	Cent	Finned	Dual	Eisemann	Auto
Walter, 7½	15,000	5,000	144	Solid	40x6	40x6d	Under hood	4	4.37	6.00	30.65	Block	Right	Cent	Finned	Dual	Eisemann	Auto
Walter, Trac	24,000	4,500	108	Solid	40x4d	40x4d	Under hood	4	4.37	6.00	30.65	Block	Right	Cent	Finned	Dual	Eisemann	Auto
Ware	6,000			Solid			Under hood	4	4.00	5.50	25.60	Pairs		Gear			Mea	
White, GBBE	1,500	2,100	133½	Pneu	34x4½	34x4½	Under hood	4	3.75	5.12	22.50	Block	Right	Cent	Cell	Sing	Bosch	Hand
White, TBC	3,000	3,000	145½	Pneu	36x4½	36x4½d	Under hood	4	3.75	5.12	22.50	Block	Right	Cent	Cell	Sing	Bosch	Hand
White, TAD	6,000	3,700	163	Solid	36x5	40x5d	Under hood	4	3.75	5.12	22.50	Block	Left	Cent	Cell	Sing	Bosch	Hand
White, TCD	10,000	4,500	165	Solid	36x5	40x6d	Under hood	4	4.25	6.37	29.00	Block	Left	Cent	Cell	Sing	Bosch	Hand
Wichita, A	2,000	1,650	110	Solid	34x3	34x4	Under hood	4	3.25	5.00	16.92	Block	L&H	Thermo	Cell	Sing	Bosch*	Hand
Wichita, B	4,000	2,100	118	Solid	34x3½	34x3d	Under hood	4	3.50	5.00	19.61	Block	L&H	Thermo	Cell	Sing	Bosch*	Hand
Wichita, H	7,000	3,250	165	Solid	36x5	36x5d	Under hood	4	4.25*	6.75	29.00*	Pairs	L&H	Cent	Cell	Dual	Bosch	Hand
Wilcox, T	1,000	1,000	115	Pneu	33x4	33x4	Under hood	4	3.50	5.00	19.61	Block		Thermo	Z-z-t	Sing	Mea	Hand
Wilcox, LA	2,000	2,000	132	Solid*	36x3½*	36x5d*	Under hood	4	4.12	5.25	27.20	Block	Right	Cent	Z-z-t	Sing	Mea	Hand
Wilcox, NA	4,000	2,500	118	Solid	36x4	36x3½d	Under floor	4	4.25	5.00	29.00	Pairs		Cent	Z-z-t	Dual	Bosch	Hand
Wilcox, JA	6,000	3,250	128	Solid	36x5	36x4d	Under floor	4	4.25	5.00	29.00	Pairs		Cent	Z-z-t	Dual	Bosch	Hand
Willet, M	1,500	1,600	125	Pneu	34x4½	34x4½	Under hood	4	3.75	5.25	22.50	Block	Right	Cent	Finned	Sing	Eisemann	Auto
Willet, L	4,000	2,600	144	Solid	36x4	36x4db	Under hood	4	4.12	5.25	27.20	Block	Right	Cent	Finned	Sing	Eisemann	Auto
Willet, K	6,000	2,800	144*	Solid	36x4	36x4db	Under hood	4	4.50	5.25	32.40	Pairs	Left	Cent	Finned	Sing	Eisemann	Auto
Wilson, B	4,000	1,800	130*	Solid	37x3½	37x5	Under hood	4	4.12	5.25	27.20	Block	Right	Cent	Finned	Sing	Eisemann	Fixed
Willys, 65	1,500	1,350	120	P&S	34x4½	36x3½	Under hood	4	4.12	4.50	27.20	Sing	Left	Thermo	Finned	Dual	Split	Hand

Received Too Late to Classify

Handy Wagon, Jr	500	390	65	Solid	34x1¼	34x1¼	Under body	2	3.75	3.75	11.25	Sing	R&H	Air		Sing	None	Hand
Handy Wagon	800	487.50	77	Solid	34x1¾	34x1¾	Under body	2	4.12	3.75	13.60	Sing	R&H	Air		Sing	None	Hand
Handy Wagon, Sr	1,200	600	86	Solid	34x1¾	34x2	Under body	2	4.75	4.75	18.10	Sing	R&H	Air		Sing	Briggs	Hand
Hurlburt, 1	2,000	1,500	120	Pneu	34x4½	34x4½	Under hood	4	3.75	4.50	22.50	Block	Right	Cent	Finned	Dual	Eisemann	Auto
Hurlburt, 2	4,000	3,000	Opt	Solid	36x4	36x4d	Under hood	4	4.12	5.50	27.20	Block	Right	Cent	Finned	Dual	Eisemann	Auto
Hurlburt, 3½	7,000	3,500	Opt	Solid	36x5	36x5d	Under hood	4	4.25	5.50	29.00	Block	Right	Cent	Finned	Dual	Eisemann	Auto
Locomobile, 3	6,000	3,500	150*	Solid	36x5	36x5d	Under hood	4	4.25	6.00	29.00	Pairs	Opp	Cent	Cell	Dual	Eisemann	Hand
Locomobile, 4	8,000	3,600	150*	Solid	36x5	36x6d	Under hood	4	4.25	6.00	29.00	Pairs	Opp	Cent	Cell	Dual	Eisemann	Hand
C. T., Tractor	10,000	4,750	155	Solid	36x4d	36x5d	Under seats	4	4.00	6.00	25.60	Sing	R&h	Cent	Sq-t	Sing	Mea	2-pt
Transit, E	2,000	2,000	120*	Solid	36x4	36x3½d	Betw. seats*	4	4.50	5.50	32.40	Pairs	Left	Cent	Sq-t	Sing	Mea	Hand
Transit, F	4,000	2,850	144	Solid	36x4	36x4d	Betw. seats*	4	4.50	5.50	32.40	Pairs	Left	Cent	Sq-t	Sing	Mea	Hand
Transit, T	7,000	3,500	144	Solid	36x5	36x5d	Betw. seats*	4	4.50	5.50	32.40	Pairs	Left	Cent	Sq-t	Sing	Mea	Hand
Transit, V	10,000	4,500	144*	Solid	36x6	40x6d	Betw. seats*	4	4.50	5.50	32.40	Pairs	Left	Cent	Sq-t	Sing	Mea	Hand
Dispatch, L	1,200	900	120	Pneu	36x3½	36x3½	Under hood	4	3.75	5.00	22.50	Block	Left	Thermo	Cell	Dual	Bosch	Hand
Morton, 1½	3,000			Solid	34x4	38x5	Under seat	4	3.75	5.25	22.50	Pairs	Opp		Cell	Dual	Bosch	Hand
Morton, 2	4,000		140	Solid	36x5	38x6		4	4.50	5.50	30.65	Pairs		Cent		Dual	Bosch	Hand
Morton, 2½	5,000		140	Solid	36x5	38x6	Under seat	4	4.50	5.50	30.65	Pairs		Cent	Cell	Dual	Bosch	Hand
Morton, 3	6,000		112	Solid					4.75	6.75								
Morton, 3½	7,000			Solid	38x6	40x6d		4	5.00	5.75	40.00	Pairs	Opp		Cell		Bosch	Hand
Morton, 5	10,000			Solid	38x7	42x7d		4	5.25	5.75	42.20	Pairs	Opp		Cell	Dual	Bosch	Hand
Morton, 6	12,000		140	Solid					5.50	7.00								
Morton, Tractor	20,000		108	Solid	40x6	40x6db		4	5.50	7.00	48.48	Sing			Cell	Dual	Split	Hand

ABBREVIATIONS: General, *, *with other options;* Opt, *optional.* **Price,** -c, *complete with body.* **Tires, Kind,** Pneu, *pneumatic;* Sol-st, *solid in front, steel in rear;* P&s, *pneumatic in front, solid in rear;* P&c, *pneumatic in front, cushion in rear;* C&s, *cushion in front, solid in rear.* **Tire Sizes,** d, *dual.* **Motor Location,** Betw seats, *between seats.* **Cylinder Cast,** Sing, *singly or individually.* **Location of Valves,** Opp, *opposite, or T-head type;* Top (2-cylinder motors only), *L-head cylinder laid horizontal with valves up;* R&h, *at right and in head, L-head cylinder;* L&h, *at left and in head, L-head cylinder;* 2-cyc, *two-cycle motor, no valves;* Back, *L-head motor placed transversely with valves at rear.* **Water Circulation,** Cent, *centrifugal pump;* Gear, *gear pump;* Thermo, *thermo-syphon circulation;* Air, *air-cooled, no water.* **Radiator Type,** Finned, *finned-tube;* Cell, *cellular or honeycomb;* Sq-t, *square-tube or flat-tube;* Z-z-t, *zig-zag-tube or crimped flat-tube.* **Ignition, Type,** Sing, *single;* Doub, *double;* Dual-d, *dual-double.* **Make of Magneto** (or other sparking device), Split, *Splitdorf;* Conn, *Connecticut;* King, *Kingston;* West, *Westinghouse;* Day-D, *Dayton-Dick;* Atw-K, *Atwater-Kent.* **Spark Advance,** Auto, *automatic;* 2-pt, *two-point fixed, battery circuit fixed in retard, magneto in advance.* **Governor Type,** Cent, *centrifugal;* L-b, *loose-ball;* Suct, *suction;* Hyd, *hydraulic.* **Governor Drive,** Motor, *from motor;* D-shft *from driving shaft;* F-wheel, *from front wheel;* Gearset, *from gearset countershaft;* Duplex, *from both the motor and the driving shaft, by overrunning clutches.*

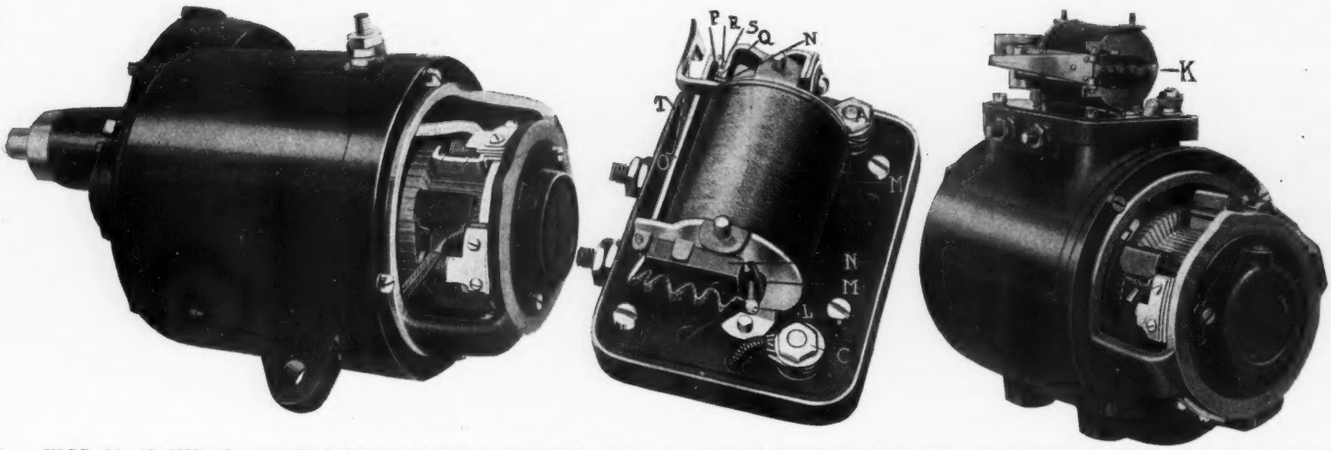
Including Capacity, Motor Speed, Final Drive, Horsepower, Etc.

MOTOR						TRANSMISSION							SPRINGS		CONTROL			
GOVERNOR		SPEEDS		Carburetor Make	Lubrication	Clutch Type	GEARSET			Total Gear-Ratio in High	Final Drive	Torque Taken By	Front	Rear	Steer	Levers	Propulsion Taken By	Name and Model
Type	Drive	Motor in R.p.m.	Truck in M.p.h.				Type	Location	Speeds									
None	None			Scheb	Circ-spl	Cone	Selec	Unit-j	3	8 -1	Dbl chn		½-Ell	½-Ell	Left	Cent	R-r	Tiffin, G
None	None			Scheb	Circ-spl	Cone	Selec	Unit-j	3	8½-1	Dbl chn		½-Ell	½-Ell	Left	Cent	R-r	Tiffin, M
None	None			Strom	Circ-spl	Dry-d	Selec	Unit-m	3		Top worm*		½-Ell	½-Ell	Left		R-r	Trabold, T
None	None			Strom	Circ-spl	Dry-p	Selec	Unit-m	3		Top worm*		½-Ell	½-Ell	Left		R-r	Trabold
None	None			Strom	Circ-spl	Dry-d	Selec	Unit-m	3		Top worm*		½-Ell	½-Ell	Left		R-r	Trabold
None	None		50	B-Z	Circ-spl	Cone	Selec	Unit-x	3	3¾-1	Bevel	Tor-t	I-½ Ell	Cant	Left	Cent	Tor-t	Trumbull, 15D
Cent	Motor	1,050	15	Breeze	Circ-spl	Dry-p	Selec	Unit-m	3	7½-1	Top worm	R-r	½-Ell	½-Ell	Left	Cent	R-r	Universal, C
Cent	Motor	1,000	11½	Breeze	Circ-spl	Dry-d	Selec	Unit-j	3	10½-1	Dbl chn		½-Ell	½-Ell	Right	Right	R-r	Universal, A
Cent	Motor	1,143	15	Strom	Circ-spl	Cone	Ind-c	Amid	3	8 -1	Dbl chn		½-Ell	½-Ell	Left	Cent	R-r	U. S., E
Cent	Motor	1,143	15	Strom	Circ-spl	Cone	Ind-c	Amid	3	8 -1	Dbl chn		½-Ell	½-Ell	Left	Cent	R-r	U. S., G
Cent	Motor	1,092	15	Strom	Circ-spl	Cone	Ind-c	Amid	3	7½-1	Dbl chn		½-Ell	½-Ell	Left	Cent	R-r	U. S., D
Cent	Motor	1,092	12	Strom	Circ-spl	Cone	Ind-c	Amid	3	9 -1	Dbl chn		½-Ell	½-Ell	Left	Cent	R-r	U. S., F
Suct	Motor	900	18	Strom	Circ-spl	Dry-p	Selec	Amid	3	7½-1	Doub-r	T-arm	½-Ell	½-Ell	Left	Cent	T-arm	Velie, X
Suct	Motor	1,000	17	Strom	Circ-spl	Dry-p	Selec	Amid	3	7½-1	Top worm	Springs	½-Ell	½-Ell	Left	Cent	Springs	Velie, U
Cent	Motor	1,000	15	Strom	Circ-spl	Dry-d	Selec	Amid	3	8½-1	Dbl chn		½-Ell	½-Ell	Right	Right	R-r	Velie
Cent	Motor	1,000	12	Strom	Circ-spl	Dry-p	Selec	Amid	3	10 -1	Dbl chn		½-Ell	½-Ell	Right	Right	R-r	Velie, Z
Cent	Motor	1,000	8	Strom	Circ-spl	Dry-p	Selec	Amid	3	12 -1	Dbl chn		½-Ell	½-Ell	Right	Right	R-r	Velie, Z5
			25	Carter	Splash	Cone	Selec	Unit-m	3	4½-1	Bevel	Tor-t	½-Ell	½-Ell	Left	Cent	Springs	Vim, L&F
		1,250	16	Strom	Circ-spl	Cone	Selec	Unit-j	3	7½-1	Dbl chn		½-Ell	½-Ell	Right	Right	R-r	Vulcan, 2
		1,250	16	Strom	Circ-spl	Cone	Selec	Unit-j	3	7½-1	Dbl chn		½-Ell	½-Ell	Right	Right	R-r	Vulcan, 3
		1,250	14	Strom	Circ-spl	Cone	Ind-c	Unit-j	3	9½-1	Dbl chn		½-Ell	½-Ell	Right	Right	R-r	Vulcan, 4
		1,250	14	Strom	Circ-spl	Cone	Ind-c	Unit-j	3	9½-1	Dbl chn		½-Ell	½-Ell	Right	Right	R-r	Vulcan, 5
Cent	Motor	1,250	13½	Strom	Circ-spl	Cone	Prog	Unit-j	4	11½-1	Dbl chn		½-Ell	½-Ell	Right	Right	R-r	Vulcan, 7
None	None	1,800	30	Marvel	Circ-spl	Wet-d	Plan	Unit-m	2	6 -1	Sing chn		½-Ell	½-Ell	Cent	None	R-r	Wagenhals
Cent	Motor	1,000	14	Zenith	Circ-spl	Cone	Selec	Unit-m	4		Int-g4	Springs	½-Ell	½-Ell	Left	Cent	Springs	Walter, 5
Cent	Motor	1,000	12	Zenith	Circ-spl	Cone	Selec	Unit-m	4		Int-g4	Springs	½-Ell	½-Ell	Left	Cent	Springs	Walter, 6
Cent	Motor	1,000	10	Zenith	Circ-spl	Cone	Selec	Unit-m	4		Int-g4	Springs	½-Ell	½-Ell	Left	Cent	Springs	Walter, 7½
Cent	Motor	1,000	10	Zenith	Circ-spl	Cone	Selec	Unit-m	4		Int-g4	Springs	½-Ell	½-Ell	Left	Cent	Springs	Walter, Trac.
Cent	Motor	1,100				Wet-d			4		Bevel-4			Plat		Right		Ware
None	None			White	Spl-press	Wet-p	Selec	Amid	4		Bevel	Springs	½-Ell	½-Ell	Left	C&l	R-r	White, GBBE
None	None			White	Spl-press	Wet-p	Selec	Amid	4		Doub-r	Springs	½-Ell	½-Ell	Left	C&l	R-r	White, TBC
None	None			White	Spl-press	Wet-p	Selec	Amid	4		Dbl chn		½-Ell	½-Ell	Left	C&l	R-r	White, TAD
None	None			White	Spl-press	Wet-p	Selec	Amid	4		Dbl chn		½-Ell	½-Ell	Left	C&l	R-r	White, TCD
		1,800	20	Strom	Circ-spl	Cone	Selec	Unit-j	3	7½-1	Dbl chn		½-Ell	½-Ell	Right	Cent	R-r	Wichita, A
None	None	1,800	20	Strom	Circ-spl	Cone	Selec	Unit-j	3	8½-1	Dbl chn		½-Ell	½-Ell	Right	Cent	R-r	Wichita, B
Cent	Motor	1,500	11	Strom	Circ-spl	Cone	Selec	Unit-j	3	9½-1	Dbl chn		½-Ell	½-Ell	Left	Cent	R-r	Wichita, H
Cent	Motor	1,100			Circ-spl	Dry-d	Selec	Unit-m			Bevel	Tor-t	½-Ell	½-Ell	Left	Cent	Tor-t	Wilcox, T
Cent	Motor	1,100	16		Circ-spl	Cone	Selec	Unit-j	3		Dbl chn		½-Ell	½-Ell	Right	Cent	R-r	Wilcox, LA
Cent	Motor	1,100	14		Circ-spl	Cone	Selec	Unit-j			Dbl chn		Ellip	½-Ell	Right	Right	R-r	Wilcox, NA
Cent	Motor	1,100	13		Circ-spl	Cone	Selec	Unit-j			Dbl chn		Ellip	½-Ell	Right	Right	R-r	Wilcox, JA
		1,004	20	Zenith	Spl-press	Cone	Selec	Amid	3	5½-1	Doub-r	Tor-t	½-Ell	½-Ell	Left	Cent	R-r	Willet, M
		945	15	Zenith	Spl-press	Cone	Selec	Amid	3	6½-1	Dbl chn		½-Ell	½-Ell	Left	Cent	R-r	Willet, L
		945	15	Zenith	Spl-press	Cone	Selec	Amid	3	6½-1	Dbl chn		½-Ell	½-Ell	Left	Cent	R-r	Willet, K
Cent	Motor	1,000	15	Marvel	Pressure	Cone	Selec	Unit-j	3	7½-1	Dbl chn		½-Ell	½-Ell	Left	Cent	R-r	Wilson, B
Cent	Motor	1,150	18	Scheb	Circ-spl	Cone	Selec	Unit-j	3	6½-1	Dbl chn		½-Ell	½-Ell	Right	Right	R-r	Willys, 65

Received Too Late to Classify

				King	Splash	Dry-d	Plan	Unit-m	2	7½-1	Dbl chn		Ellip	Ellip	Right	Right	R-r	Handy Wagon, Jr.
				King	Splash	Wet-d	Plan	Unit-m	2	7½-1	Dbl chn		Ellip	Ellip	Right	Right	R-r	Handy Wagon
				King	Splash	Wet-d	Plan	Unit-m	2	7½-1	Dbl chn		Ellip	Ellip	Right	Right	R-r	Handy Wagon, Sr.
Cent	Motor	1,250	18	Flech	Spl-press	Dry-d	Selec	Unit-m	3		Top worm	Springs	½-Ell	½-Ell	Left	Cent	Springs	Hurlburt, 1
Cent	Motor	1,250	15	Flech	Spl-press	Cone	Selec	Amid	3		Top worm	Tor-t	½-Ell	½-Ell	Left	Cent	R-r	Hurlburt, 2
Cent	Motor	1,250	13	Flech	Spl-press	Cone	Selec	Amid	3		Top worm	Tor-t	½-Ell	½-Ell	Left	Cent	R-r	Hurlburt, 3½
Cent	Motor	1,150	12*	Own	Pressure	Cone	Selec	Amid	4	10-1	Top worm	T-arm	½-Ell	½-Ell	Right	Right	R-r	Locomobile, 3
Cent	Motor	1,150	12*	Own	Pressure	Cone	Selec	Amid	4	10-1	Top worm	T-arm	½-Ell	½-Ell	Right	Right	R-r	Locomobile, 4
Cent	Motor	1,350	13	Strom	Circ-spl	None	Elec	Unit-m	2	20½-1	Doub-r	Springs	½-Ell	½-Ell	Left		R-r	C. T., Tractor
Cent	Motor	1,200	15	Ray	Splash	Wet-d	Selec	Unit-j	3	7 -1	Dbl chn		½-Ell	½-Ell	Right	Right	R-r	Transit, E
Cent	Motor	1,200	14	Ray	Splash	Wet-d	Selec	Unit-j	3	9 -1	Dbl chn		½-Ell	½-Ell	Right	Right	R-r	Transit, F
Cent	Motor	1,200	12	Ray	Splash	Wet-d	Selec	Unit-j	3	10 -1	Dbl chn		½-Ell	½ Ell	Right	Right	R-r	Transit, T
Cent	Motor	1,200	10½	Ray	Splash	Wet-d	Selec	Unit-j	3	13 -1	Dbl chn		½-Ell	½-Ell	Right	Right	R-r	Transit, V
Suct	Motor	1,500	25	Ray	Press	None	Fric	Amid	5		Dbl chn		Ellip	Ellip	Right	Cent	R-r	Dispatch, L
Cent	Motor			Carter	Circ-spl	Wet-d	Selec		3		Top worm		½-Ell	½-Ell	Right	Right		Morton, 1½
L-b	Motor			Carter	Spl-press	Wet-d	Selec		3		Top worm		½ Ell	½-Ell	Right	Right		Morton, 2
L-b	Motor			Strom*	Spl-press	Wet-d	Selec		3		Top worm	Tor-t	½-Ell	½-Ell	Right	Right	Springs	Morton, 2½
							Selec		4		Top worm4							Morton, 3
Cent	Motor			Carter	Circ-spl	Wet-d	Selec		3		Top worm		½-Ell	½-Ell	Right	Right		Morton, 3½
Cent	Motor			Carter	Circ-spl	Wet-d	Selec		3		Top worm		½-Ell	½-Ell	Right	Right		Morton, 5
							Selec		4		Top worm4							Morton, 6
			14		Spl-press	Wet-d	Selec		3		Top worm							Morton, Tractor

Carbureter Make, Strom. *Stromberg* ;Scheb, *Schebler;* Ray, *Rayfield;* Excel, *Excelsior;* King, *Kingston;* B-Z, *Breeze-Zephyr.* **Lubrication,** Splash, *non-circulating or simple splash;* Circ-spl, *circulating-splash;* Spl-press, *splash-pressure;* Fuel-inj, *fuel injection, oil mixed with fuel;* Pressure, *pressure feed, no splash.* **Clutch Type,** Dry-p, *dry plate;* Dry-d, *dry multiple disk;* Wet-d, *wet disk or disk-in-oil;* R-cone, *reversed cone or inverted cone;* Exp-s, *expanding shoe;* Cont-b, *contracting band.* **Gearset Type,** Prog, *progressive sliding gear;* Selec, *selective sliding gear;* Plan, *planetary;* Ind-c, *constant-mesh individual-clutch;* Fric, *friction;* Hyd, *hydraulic;* Elec, *Electric.* **Gearset Location,** Amid, *amidships;* Unit-m, *unit with motor;* Unit-j, *unit with jackshaft;* Unit-x, *unit with axle;* Unit-s, *unit driveshaft.* **Final Drive,** Bevel, *direct bevel;* Doub-r, *double-reduction, bevel and spur;* Int-g, *internal gear;* Top worm, *worm gear with worm on top;* Dbl chn, *double chain;* Sing chn, *single chain;* -f, *to front wheels;* -4, *to all four wheels.* **Driving Torque,** R-r, *radius rods;* T-arm, *torque-arm;* Tor-t, *torsion tube;* Sub-f, *sub-frame.* **Springs,** Ellip, *elliptic;* ½-Ell, *half-elliptic;* ¼-Ell, *quarter-elliptic;* ¾-Ell, *three-quarters-elliptic;* Plat, *platform;* T-ell, *transverse elliptic;* Cant, *cantilever;* Comb, *combination of half-elliptic and elliptic on double frames.* **Steering,** Cent, *center.* **Levers,** Cent, *center;* C&r, *gearshift center, brake right;* C&l, *gearshift center, brake left;* St-col, *steering column.* **Propulsion,** R-r, *radius rods;* T-arm, *torque arm;* Tor-t, *torsion tube;* Sub-f, *sub-frame.*



FIGS. 11, 12 AND 13—UNITS OF THE WAGNER SYSTEM. FIG. 11, AT THE LEFT, SHOWS THE CRANKING MOTOR; FIG. 12, IN THE CENTER, SHOWS THE CUT-OUT RELAY; AND FIG. 13, AT THE RIGHT, ILLUSTRATES THE WAGNER GENERATOR WITH THE CUT-OUT RELAY MOUNTED UPON IT

Electric Lighting, Cranking and Ignition Systems

Standard Types and How They Operate

Part II—Wagner, Dyneto and Bosch

By Darwin S. Hatch

Editor's Note—This is the second of a series of articles descriptive of standard types of electric lighting, starting and ignition systems as installed as stock equipment on 1915 cars. The first installment of the series appeared January 7 and covered the theory of the subject in general

ELECTRICAL and mechanical characteristics of Wagner systems differ for each make of car, for the Wagner starter is built to order, to fit the design of each engine it is to start. However, the concern confines itself to separate unit systems.

The starting motor is of the usual series-wound type, with reduction gearing between it and the motor shaft. The motor may drive the engine through pinion meshing with flywheel or by chain to the crankshaft. The generator, Fig. 13, is wound for constant current, and its rate of charge is dependent upon the state of charge of the battery, and the speed at which it is driven. It is, therefore, unnecessary to include any special regulating device.

The cut-out relay is shown in Fig. 12. This relay consists of two magnet coils L and M, wound on an iron core N. This iron core attracts an iron lever O, when current flows through the shunt coil. At the end of the lever O are two main contact points P and Q, at which the contact between the generator and battery is made and broken. There are two auxiliary contact points R and S, which are for the purpose of minimizing the sparking at the main contact points P and Q. The coil M, called the shunt coil, is connected directly across the two brushes of the generator, and, therefore, the full generator voltage is impressed on this coil. The coil L, called the series coil, is connected in series with the generator and the battery, and, therefore, carries the charging current when the battery is being charged.

The generator is connected to the engine through a chain, or directly on the pump shaft, and its speed, and, therefore, its voltage varies with the engine speed. As soon as the generator voltage rises to a point above the voltage of the battery, the coil M is sufficiently energized to pull the iron lever O towards the magnet core, thereby closing the contacts P and Q, R and S. Thus as the connection made to the battery, and a current will flow from the generator through the series coil L to the battery.

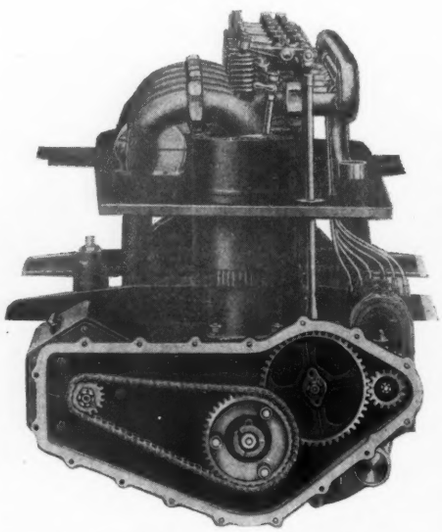


FIG. 14—DYNETO MOTOR-GENERATOR AS INSTALLED ON A FRANKLIN ENGINE, SHOWING THE CHAIN DRIVE

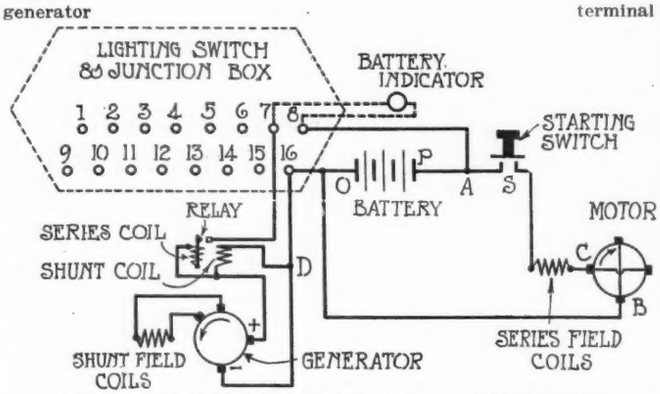


FIG. 15—WIRING DIAGRAM SHOWING CONNECTIONS AND CURRENT PATH IN WAGNER SYSTEM

The generator continues to charge as long as these contact points—P and Q, R and S—remain together, but when the engine speed is decreased, so that the generator voltage falls below the battery voltage, the battery will discharge through the generator and therefore through the coil L. This discharge current, being in the opposite direction from the charging current, will neutralize the effect of coil M and allow the spring to pull lever O away from the magnet core, thereby opening the contact at the point P and Q, R and S. As soon as these contacts open, the battery is off charge. The engine speed at which this relay closes corresponds to a car speed of 7 to 10 miles per hour.

The connections as employed in Studebaker cars will be seen by referring to the wiring diagram, Fig. 15. Motor circuit—starting at the right-hand terminal P of the battery, follow line to right to starting switches, through the starting switch, through the series field of motor to C; through motor armature to B, and back to left-hand terminal O of the battery.

Generator circuit—starting at generator terminal marked + follow up and left, to the relay. If the speed of the engine is great enough to operate the relay, part of the current will go through shunt coil to D and back to generator terminal, marked —. The remainder of the current will flow through the series coil to the junction box to 7, to battery indicator, to 8 at junction box, to R to battery at P, through battery, and back to negative terminal of the generator.

DYNETO SYSTEM

THE Dyneto starting and lighting system, known last year as the Dyneto-Entz and before that as the Entz system, is used on Chalmers, White and Franklin cars, makes use of a motor-gen-

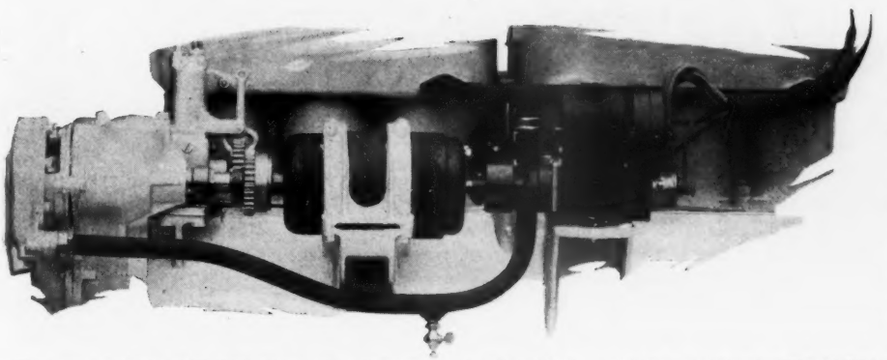


FIG. 16—BOSCH GENERATOR AS APPLIED TO MARMON ENGINE, DRIVEN THROUGH MAGNETO SHAFT

erator. Ignition is a separate installation so that the Dyneto system comprises one unit of a complete two-unit electric system.

The chief feature of Dyneto equipment is that it makes the engine non-stallable. At speeds above approximately 10 miles per hour, the Dyneto, as the motor-generator unit is called, operates as a generator and below that speed it operates as a motor. The power available from the motor increases as the speed is diminished, so that at very low speeds it drives the car by keeping the engine turning over if the latter refuses to fire.

This is accomplished by the winding of the instrument, there being a compound winding of shunt and series fields. Regulation is accomplished by the differential action of the shunt and series field windings, the maximum current being fixed to the capacity of the battery installed.

The system is particularly simple, comprising only the motor-generator, battery and switch. The motor-generator is unusually light and is permanently coupled to the crankshaft through a silent chain reduction of from 2½ or 3 to 1. This, with a 12-volt storage battery and a switch are interconnected by two wires from motor-generator to switch, one from motor-generator to battery and one through the switch to battery.

The switch is mounted upon the dash and is hand operated. It is arranged to make the ignition connections as well as the starting connections—this being the only feature in which the ignition figures in the system.

The operation is as follows: In starting, the switch above mentioned is to be closed and left closed; the Dyneto will then operate as a motor and spin the engine at from 125 to 200 revolutions per minute, depending somewhat on the engine to which it is connected. After the engine begins to run under its own power, the Dyneto will automatically change to a generator and charge the battery and will change back automatically to run as a motor and help the engine at low speeds. Fig. 15 shows the application of the Dyneto to a Franklin engine.

BOSCH AND BOSCH-RUSHMORE DESIGNS

THE BOSCH MAGNETO CO. has acquired the former Rushmore interests and is marketing Rushmore equipment as Bosch-Rushmore. In addition the Bosch company has developed a system of its own, which is called the Bosch system.

The Bosch starting and lighting system is two units of a three-unit system comprising separate motor, and generator, operating at 12 volts with a grounded return. The system is used on large six-cylinder motors and on cars in which the flywheel is not accessible enough to provide for flywheel installation. Usually the cranking motor is connected with the crankshaft by silent chain in connection with an over-running clutch. The Bosch starting motor weighs about 35 pounds and is almost 6 inches in diameter and 10¼ inches long.

The Bosch starting motors, Fig. 19, are of the over-running clutch type and in order to insure correct switching in of the motor in the circuit the starting switch is not operated directly but through the agency of a small pilot switch. Pressure on the small starting button at the right causes the contacts in the main switch to close, thereby connecting the motor directly with the battery circuit.

A small switch is fitted on cars where it is desired to retain the starting crank. When cranking up, this switch automatically cuts out the magneto and connects the battery side of the ignition system. Immediately the engine fires the battery current is replaced by the magneto, also automatically.

A characteristic of the Bosch installation is that the dynamo is designed to operate at engine speed. One type of generator, built somewhat on the lines of the Bosch magneto, is fitted with dowel pins at the base plate which registered with holes in the base of the dynamo and the height of the armature shaft from the base is such that it may be driven from the ordinary magneto coupling.

At 350 r.p.m. the dynamo shows 12 volts while its normal output of 7½ amperes at 13½ volts is reached at 650 r.p.m. The dynamo is shunt-wound, the field magnet excitation being governed by an electromagnetic, automatic controller carried in the switchboard. The controller reduces the strength of the field as the speed increases and conversely increases the field strength as the speed decreases.

The switchboard unit, Fig. 18, contains a meter of novel construction, the lamp switch and the dynamo switch, as shown in the illustration. The meter is a combination voltmeter and ammeter and registers both charge and discharge. Throwing the switch to one side causes the meter to register voltage and to the other current, the same dial serving for both readings.

The Bosch-Rushmore starting and lighting system, formerly the Rushmore, comprises the entire line as previously made by the Rushmore company. These include separate motor and generator with separate magneto. They come under the class of three-unit systems. The installations all are used on the flywheel in connection with an end-throw arrangement that automatically engages and disengages the gear wheel on the end of the armature shaft with the toothed flywheel, Fig. 18.

In the Bosch-Rushmore starting motors, made in 6 and 12 volt styles, there is no engagement with the flywheel, except when starting the engine. The motor is series wound, the armature being held normally out of the line with the pole pieces by means of a compression spring in the commutator end of the shaft, Fig. 17. When the switch is closed the armature is drawn by magnetic attraction into its normal position thereby meshing the pinion with the flywheel. To hold the armature in position against the compression of the spring it is made a little longer than the pole pieces so that a certain amount of end pull is exerted while the armature is turning.

(To be continued)

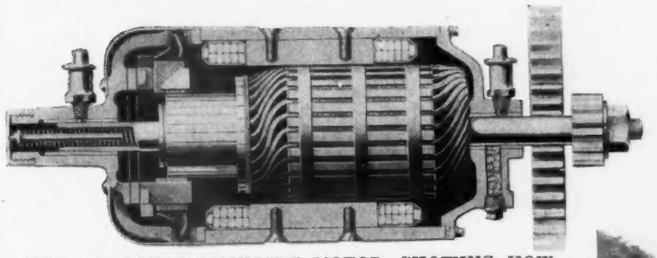
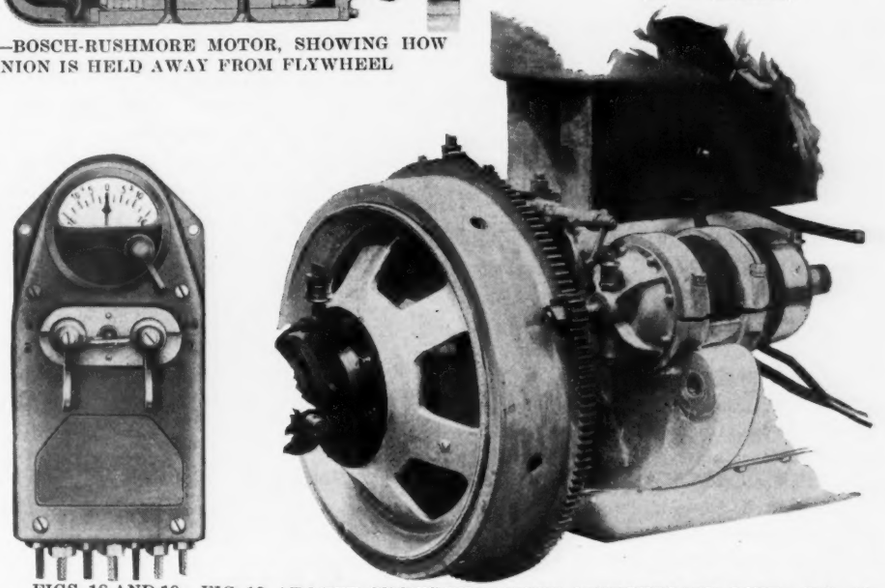


FIG. 17—BOSCH-RUSHMORE MOTOR, SHOWING HOW PINION IS HELD AWAY FROM FLYWHEEL



FIGS. 18 AND 19—FIG. 18, AT LEFT, SHOWS THE BOSCH SWITCHBOARD UNIT; FIG. 19, AT RIGHT, ILLUSTRATES THE BOSCH CRANKING MOTOR AS INSTALLED ON A MARMON

The Readers' Clearing House

SAYS HIGHWAY PLAN IS ABSURD

Beautification Idea and Its Objections Outlined by Iowan

MONTEZUMA, Ia.—Editor Motor Age—I am very much in favor of making the highways as beautiful as possible, but the plans suggested in Motor Age, issue of December 17, are about the most absurd that could be imagined, particularly to Iowa farmers, many of whom are car owners.

The Iowa farmer has worked for 50 years to get the Iowa roads up to their present state of efficiency. He has found that weeds, trees and hedges along the roads add anything but beauty. They make it impossible to cut noxious weeds with any tool except the hand scythe. If willows line the south side of an east and west road one will find that the road is either a bad mud hole or very rough, as the sun seldom strikes the road. Tile is used in Iowa and it is impossible to keep them open if the drain runs near the roots of trees. Trees along the fence line rob the soil for 20 to 40 feet each way. I have known 40 rods of hedge and willows to cost the land owner $50 to $150 a year in decreased yield of grain. This is a conservative statement.

Iowa still has miles of hedges, willows and maples that would be better killed out. She has laws that cover such, but they are not enforced. We do not want shaded highways in Iowa as long as we have our present black dirt roads.

As long as Iowa is dry, our roads are the best, but our corn fields need rain. We usually get all the rain we need and our corn yield is the best. We must have all the sunshine strike the black dirt road or our roads will be poor. Let us build good fences, have a green strip of grass between the road and the fence, and raise bumper crops beyond the fence. Is not this good enough to look at?

A word in closing. There are thousands of places on the Lincoln highway which need improvement where money can be spent to better advantage than making a flower garden of it. The Lincoln highway does not lack in beauty in its present condition. It is all in the way one looks at it. —W. E. McKee.

Soldering Brass and Aluminum

Jordon, Mont.—Editor Motor Age—In Motor Age, issue of December 10, in answer to an inquiry by A. N. Bevis, of Bascom, Fla., the statement is made that brass cannot be soldered to aluminum.

This may be done in two ways, though with no great strength, it is suitable for tanks or fancy work. Aluminum solder may be used with brass, but better with copper, and will stick to common solder very rapidly, or the piece of aluminum may be coated with aluminum solder, then soldered to brass with the common solder. In using it is better to rivet such pieces, for strength, then solder them to prevent leaks.—W. E. Freeman.

THINKS MAGNETO MAGNETS WEAK

Better to Get New Set for Ford Car—Starting Is Hard

Harris, Mo.—Editor Motor Age—Do the magnets in a Ford engine need charging after being used a year?

2—Kindly show how this can be done conveniently.

3—If the above trouble is not the cause of hard starting of Ford cars, what is the cause?

4—Is it safe to rebore Ford cylinders ⅛ inch larger?—V. R. Purdy.

1—In all probability a recharging after a year's use will be beneficial.

2—It is cheaper and better to buy a new set of magnets. This is the advice given by the Ford company, which will give you complete instructions for removing the old magnets and installing the new ones.

3—The hard starting may not be caused by a weak magneto only. In cold weather the usual trouble is due to poor carburetion. Motor Age does not know what make of carbureter you have, and hence the adjustments cannot be given. A primer, no doubt, will be of assistance. With this, a rich charge may be taken into the cylinders at the first turn of the crank.

See that the spark plug points are clean and adjusted to about 1/32 inch, that there are no air leaks about the inlet manifolds, cylinder plugs, spark plugs, etc., and that the coil vibrators are neither too far apart nor too close.

4—Do not bore out ⅛ inch. Reboring should be done by thousandths of an inch, depending upon the eccentricity of the cylinders. Let a competent machinist examine the cylinders or take them to the nearest Ford service station.

CLAIMS LINCOLN HIGHWAY SAFE

No Cases of Tourists Being Molested, States Wyoming Reader

Rawlins, Wyo.—Editor Motor Age—In answer to Robert J. Miller, Reading, Pa., regarding "Protection Along the Lincoln Highway": Thousands of transcontinental tourists go through here each year, and I have yet to hear of one being robbed or molested in any way. I am sure that Mr. Miller need not hesitate in making the trip on this account, and that he will find the west a civilized, growing, healthy country, and he will be pleased to call again.—Homer A. France.

Battery in Delco System

Litchfield, Mich.—Editor Motor Age—Kindly explain fully the construction and working principles of the Delco system of starting.

2—What make of storage battery is used?

3—What is the specific gravity of same when properly charged.—R. J. Simpson.

1—A complete description of the Delco cranking, lighting and ignition system will be given in a story on such systems in the show numbers of Motor Age, the first of which appeared December 31.

2—An Exide battery is used.

3—The specific gravity when fully charged should be between 1,280 and 1,300.

Cost of Alaska License

Milwaukee, Wis.—Editor Motor Age—What does a license cost in Alaska for a 30-horsepower, ¾-ton delivery car? Is any special color required, and are tags furnished?—Jack Sipes.

Alaska is a territory and its registration fee is not listed. You will have to communicate with the Secretary of State at Washington, D. C.

WANTS TO USE A FUEL MIXTURE

Gasoline and Kerosene Give Fairly Good Results—Lightening Parts

Detroit, Mich.—Editor Motor Age—I have a Rambler model 44 touring car which I would like to convert into a raceabout. About what speed could be expected with the top and mud guards removed?

2—Would it be worth while to lighten the pistons and connecting rods?

3—Could Motor Age give any information in regard to the Air-friction carbureter when used with a mixture of kerosene and gasoline.—G. F. Stock.

1—The removal of the top and fenders would increase the speed slightly, but just how much Motor Age cannot state.

2—Yes.

3—Practically all carbureters will handle a mixture of two-thirds gasoline and one-third kerosene, but just what results you will get with an Air-Friction carbureter cannot be answered because Motor Age has not tried it. If the air used is sufficiently heated you will find little difficulty in using the mixture above mentioned.

ONE OR TWO-NOZZLE CARBURETER?

Number of Jets Not Only Factor in Obtaining Flexibility, etc.

Beemer, Neb.—Editor Motor Age—For four-cylinder, block cast motors of 3½ by 5 cylinders, will a single-jet carbureter supply sufficient fuel at high speed for absolute maximum power and with this same adjustment give economy and flexibility at all motor speeds, particularly at lower speeds? Realizing that it is not the policy of Motor Age to give preference to any particular make I will not ask you to recommend any particular make, but I would like to have you outline in a general way which type is most satisfactory for a combination of economy, power, flexibility and all.

It seems to me that two small nozzles would more thoroughly atomize and vaporize the fuel than a single jet supplying the same quantity and by having the two nozzles, only one of them working at low and medium speeds, greater

Questions Answered and Communications Received

W. E. McKee	Montezuma, Ia.
W. E. Freeman	Jordon, Mont.
V. R. Purdy	Harris, Mo.
Homer A. France	Rawlins, Wyo.
R. J. Simpson	Litchfield, Mich.
Jack Sipes	Milwaukee, Wis.
G. F. Stock	Detroit, Mich.
G. Sharp	Beemer, Neb.
W. H. Smith	Shreveport, La.
Reader	Mayville, N. D.
A Subscriber	College Point, L. I.
A Subscriber	Collis, Minn.
E. V. Skaglin	Lynn Haven, Fla.

No communication not signed with the reader's full name and address will be answered.

economy could be had than from a single, larger jet. With the grade of fuel we are using at the present time, we find that the more heat we can supply to the carbureter, particularly in winter, the better results and economy we get.

2—Will a full waterjacketed carbureter and intake manifold and the fixed air intake drawing all hot air, give superior results over hot air only? I find that on cold days it takes almost 20 miles of driving, when using hot air only, to get the inlet manifold thoroughly warmed up and then it is not as hot as though it were full waterjacketed.

Practically all carbureters will give good results, but as in everything else, some are better than others.

For a certain fixed motor speed and road condition, it is easy to get power, or, if you want it, economy, but for a combination of power and economy in the same carbureter for varying road speeds and conditions, not all carbureters will give it. Will Motor Age give an opinion as to the type coming nearest to these requirements.

3—Why is it that the United States Government specification for army motor trucks prefer T or L-head motors and do not want the overhead valve construction?—G. Sharp.

1—The prevailing impression is that with one nozzle it is difficult to obtain all of the qualities you mention, but there are many peculiarly-designed one-nozzle carbureters which give excellent results and compare favorably with a two-jet type. It is almost impossible to tell just which type is the better unless the exact design of each is taken into consideration because the number of nozzles alone does not determine the flexibility, economy, power and speed capabilities of a carbureter.

It is established that the use of hot air for the carbureter is a necessity with the present grade of fuel and you will find that you can cut down the amount of fuel as you increase the amount of heat supplied, up to a certain point.

2—The average waterjacketed carbureter using hot air also will show better economy than the average unwaterjacketed carbureter using hot air.

A double-jet waterjacketed carbureter, using hot air will probably show better results for economy, flexibility, power and speed than one of the same type unwaterjacketed and using no hot air, but since there are other things to consider besides nozzle number and heated air Motor Age cannot point to one particular design and say it is best. Recently some single-jet instruments have been announced and their action is such, it is claimed, that the results are like those obtained from a double-jet. The new Stromberg model K and the Browne are such carbureters.

3—Motor Age does not know.

READER'S CAR LACKING IN SPEED

Ignition Seems to Be Out of Time—Carbureter Adjustments

Shreveport, La.—Editor Motor Age—I have a Cole, Six, 1914 model and find it impossible to get over 40 miles an hour out of it. It has a Stromberg carbureter model G-3, and Delco ignition. Will Motor Age kindly tell if there is any change which could be made on the carbureter to give greater speed.

The car runs smoothly, but in the morning when the spark lever is pulled half way down in starting, the engine doesn't pick up as quickly as it should, and if the spark lever is pulled all the way down, a knocking occurs. Could the trouble be in the ignition?

2—What is the bore, stroke and horsepower of the six-cylinder Cole car?—W. H. Smith.

1—A motor with properly timed ignition should not knock when running idle even with the ignition spark fully advanced. Apparently the Delco distributer is not properly timed and if unfamiliar with the work you should allow the Cole agency to do it. Or write the Delco company and a field service man will be sent out.

It may be that the carbureter is not tuned to give best results and in order to assist you, Motor Age is sending you by mail complete instructions for adjusting the model G Stromberg.

2—The 1914 Cole six has a bore and stroke of 4.25 by 5.25 and an S. A. E. horsepower rating of 43.8.

TROUBLE WITH BATTERY CHARGING

Reader in North Dakota Far From a Service Station

Mayville, N. Dak.—Editor Motor Age—How often should the storage batteries be charged when the car is laid up for about 3 or 4 months during the winter? The instructions say it should be charged every two weeks when the car is not in use. Is it very injurious to the battery to let it stand untouched all this time if it is well charged in the beginning? It is almost impossible to carry the battery out, install it back in the car, get the radiator filled with water and alcohol and get the engine started in zero weather every two weeks. There is not a charging station in this vicinity.—Reader.

1—Since the instructions call for charging every 2 weeks you should try to live up to the rule. However, you are handicapped because of lack of facilities and Motor Age suggests that you ship the battery to the nearest charging station, giving them instructions to care for the battery throughout the winter months. In shipping the battery use an ordinary wooden box, half-filled with excelsior. Break the top of the box in half and nail the pieces together so that they form an inverted V, that is, house-top fashion. This will prevent the battery being upset during transit.

FEATURES OF REAR AXLE GEARSET

Advantages and Disadvantages Set Forth for This Construction

College Point, L. I.—Editor Motor Age—Kindly give definitions of all the latest ignition systems such as the dual, double, independent, etc.

2—Is a high-tension transformer the same in principle and operation as the outside coil of a low-tension system?

3—Can two, 3½-volt, 4-candlepower lamps, connected in series, be used in place of two 3½-volt, 2-candlepower lamps without making any changes in the wiring?

4—Does it make any difference what candlepower bulbs are used provided they are of the same voltage?

5—What is the formula for estimating the rated horsepower of a two-cycle engine?

6—What are the advantages and disadvantages of a transmission in the rear axle?—A Subscriber.

1—See the explanation of tables on page 33 of the December 31 issue of Motor Age for these definitions.

2—All transformer coils are constructed essentially in the same way, that is, they employ a primary winding of rather thick wire around which is another coil of many turns of fine wire, the two coils being insulated from one another.

3—Yes.

4—It does not make any difference provided the current line can take care of the higher candlepower lamps, which require more current than those of low candlepower, using the same type of filament.

5—The American Power Boat Association gives the following as a formula for the horsepower of two-cycle gas engines:

Two thirds of $D^2xN \div 2.1008$.

Where D is the bore in inches and N the number of cylinders.

6—Engineers in favor of the rear axle construction state that this type is more quiet than the others, that the rear axle gearset unit, being heavier than the usual rear axle form, better traction is gained by the tires, which means less skidding. Further discussion brings out that the rear axle gearset requires a number of long control rods, which the unit with motor and amidships construction does not call for. A longer drive shaft is possible when the gearset is a unit with the rear axle, which means that there is less strain on the universals, in the opinion of a number of engineers. According to another only one grease retaining reservoir is necessary and this statement is supplemented by another engineer to the effect that the grease contained in the case is not thinned by the heat of the motor or the muffler pipe. With the rear axle type the clutch is accessible usually. One engineer upholding the rear axle type claims that in a certain make the gears of the gearset may be removed in a very short time by the removal of the tonneau floor boards which is no more difficult than the removal of the front floor boards. An advocate of unit with motor construction states that in his construction the entire gearset may be inspected and oiled without difficulty, whereas with the rear axle construction inspection is not easy and lubrication difficult. That the rear axle with gearset weighs more than other types, is brought forward, but is argued against by one maker who adds that his rear axle weighs but 20 pounds more than does the ordinary form of rear axle.

With the rear axle gearset the axle shaft must be heavy, which increases the weight on the tires, and it is stated this extra weight means greater tire wear. The statement is made that the rear axle type simplifies the chassis, but an opponent brings out that the control linkage is not simple and that the oscillation of the car springs is communicated to the sliding gears which result in indefinite gear location.

Fitting Plates to the Pistons

Collis, Minn.—Editor Motor Age—What advantage is gained by placing a plate on the pistons to obtain higher compression? Will it cause an excessive vibration in a motor running 2,000 r. p. m.?—A Subscriber.

Many owners have fastened plates to the piston tops in order to increase the compression and gain power and speed, but the construction is not advised as the results obtained are not worth the expenditure in time and money. All depends upon the weight of the plates as to whether the vibration will be high.

Gnome Rotary Motor

Lynn Haven, Fla.—Editor Motor Age—Kindly give illustration and describe the Gnome rotary motor.—E. V. Skaglin.

A brief description of this motor was given in the Readers' Clearing House Department in the issue of December 16.

From the Four Winds

COLUMBUS Has Safety Zones—Commencing January 4, safety zones were established in the downtown business section of Columbus, O. The zones measure 80 by 6 feet and have been marked with standards. The no-parking places have also been marked with standards.

Cloud Headlights, Seattle Request—The Automobile Club of Seattle has asked visiting motorists as well as car owners of that city to use soap or brass polish and cloud the inside upper half of the glass front of head-lights. By using this simple precaution, motorists comply with the new regulations and at the same time have plenty of light for the operation of the car.

"A Solomon Come to Judgment"—It has remained for an Ohio jury to bring in a verdict for a motoring defendant, when it was the plaintiff that was suing for damages to an injured horse. William Wilkie, of Bowling Green, last summer struck a horse owned by William C. Bredehoft. The latter sued for $250, because one leg of the animal was broken. At the trial a few days ago, a jury brought in a verdict for the defendant and gave him $5 for injuries his machine sustained when it struck the horse. The horse had broken out of a field.

Troublesome Mountain is Conquered—By completing a 4 per cent grade over the Summer lake hill, Lake county, Ore., has contributed another $10,000 link to the Pacific highway. Summer lake mountain long has been a thorn in the side of motorists. It is more than 6 miles long, and in most places steep and rocky. A crew of road-makers has been working on the new grade since the spring of 1913 and the 30-foot highway just completed is a vast improvement over the old road. All of this work was done without bonding the county.

To Rush Work on Colorado Roads—The fourth annual convention of the Lincoln Highway Association of Colorado, which is now officially established as the Colorado division of the Pike's Peak Ocean-to-Ocean Highway Association, will be held in Denver, January 20. The importance of making all the additional improvements possible in time for the heavy tourist travel expected on account of the two expositions in California this year will be brought before the gathering and diligent action urged all along the line. This route passes through Limon, Colorado Springs, Manitou, Ute Pass, Green Mountain Falls, Buena Vista, Leadville, Tennessee Pass, Red Cliff, Eagle, the Canyon of the Grand, Glenwood Springs, Rifle, Meeker and Rangely, Colo., and Jensen, Vernal, Roosevelt, Myton, Duchesne, Colton and Provo, Utah, to Salt Lake City. The longest desert stage is only 25 miles.

May Vote Funds to Buy Toll Roads—An increase in the state tax rates and the taxation of real estate by the state of Pennsylvania in order to raise a fund of $6,000,000 to $7,000,000 a year for the abolition of toll roads and for the improvement of the state highway system will be urged at the session of the legislature now in session. A bill is now being drafted by the Pennsylvania Motor Federation and other motoring associations of the state and will be introduced early in the session. The bill will provide that most of the increase be placed on all present state paying taxables. A levy upon real estate will be asked to raise between $2,000,000 and $3,000,000 of the total sum. The principal motive behind the drafting of the bill, one of its authors said, was to impress upon the members of the legislature the importance of abolishing toll roads and completing the construction of permanent roads on the entire state highway system of 10,000 miles.

Big Car Shipment to Hawaii—The steamship "Matsonia," clearing from San Francisco, Cal., January 2 for Honolulu and the Hawaiian Islands, among other freight carried forty motor cars. Honolulu is buying many cars, a shipment being made by nearly every steamer.

Reo Trucks for World's Fair—The San Francisco Sightseeing Co. will shortly put into operation a fleet of Reo trucks, on which will be mounted large sightseeing bodies. These will be used in the transportation of visitors to and from the exposition and to other points of interest in the city.

City Lights Out, Motor Car to Rescue—Joe Tiner, an enterprising hotel man of Ellensburg, Wash., found a new field of usefulness for his Studebaker six, when the city lighting plant went out of commission. After experimenting with kerosene lamps and candles, he finally got busy with the generator on his car, made connection with the hotel wiring, started up his motor and immediately came into possession of a satisfactory lighting system of his own. The next day the Ellensburg Telephone Co. tapped the "Studebaker circuit" and the car generator sustained the added load without trouble.

Motor Cars Aid Santa Claus—The Merchants Auto Delivery Co., of Galesburg, Ill., which entered the field on May 1, delivered between 6,000 and 7,000 packages the day before Christmas and every one reached the consignee in good condition. The company has added a number of clients of late and is demonstrating to the business men of Galesburg that it can save money in comparison with the individual delivery service.

To Route Part of Pike's Peak Road—David Estaque, of Jacksonville, Ill., has agreed to measure and mark that portion of the Pike's Peak highway which extends from Jacksonville to the Illinois river. It is claimed that this stretch is the only open gap in the highway for the entire distance from Utah to Washington, D. C. It is desired to secure the complete data for the 1915 route books.

Seven Million Dollars for Roads—Seven million dollars will be expended on the roads of Los Angeles county during 1915. A highway will be built into the Yosemite Valley and the "Levee highway" will be built over the Los Angeles river. Three hundred and twenty-four miles of concrete boulevard will be constructed and 160 miles of decomposed granite highway will be built. This is the work outlined to date by the Automobile Club of Southern California.

Quaker Licenses Net $1,085,039—Motor car licenses netted the state of Pennsylvania $1,085,039 for the year 1914. The statement just issued shows that 106,401 pneumatic tired cars were licensed, 6,453 solid tire machines, 1,176 tractors and 118 trailers. Over 52,000 drivers and operators received licenses and 3,579 dealers were given privilege to operate cars pending sale. Thus far 30,000 pneumatic tired vehicles and 3,500 solid tire machines have been licensed for 1915.

Washington Plans for Future Roads—The general public highway program in the state of Washington, provided for by the 1913 legislators and carried out by the highway commission during the biennium just closing, has been endorsed by the highway board as the basis for the program for the ensuing biennium of 1915-16. A tentative apportionment of the funds that will be raised by the mill public highway levy, as provided by the last legislature, was approved. The 1 mill levy would raise several thousand dollars in excess of $2,000,000 provided during the 2 years, and the tentative apportionment shows $647,302 for roads east of the Columbia River and $1,294,600 for those west.

Funds for Trans-state Boulevard—Plans for a $750,000 bond issue by the state of Delaware for the construction of a boulevard to connect with the Pennsylvania and Maryland lines at either end of the state, are being prepared by motorists and farmers throughout the state, with a view to presenting the matter to the legislature, which is now is session. While all of the arrangements have been about completed, nothing definite is to be done until word is received from T. Coleman du Pont as to what plans he has for the construction of the Du Pont boulevard, which was started some time ago and stopped by litigation. Mr. du Pont is now in a hospital in Rochester, Minn., where he recently underwent an operation.

Coming Motor Events

SHOWS AND CONVENTIONS

January 2-9—New York show.
January 7-9—Show, Pasadena, Cal.
January 8-14—Show, Milwaukee, Wis.
January 9-16—Philadelphia show.
January 16-23—Show, Cleveland, O.
January 16-23—Show, Detroit, Mich.
January 18-23—Show, Rochester, N. Y.
January 19-23—Show, Baltimore, Md.
January 20-23—Show, Lancaster, Pa.
January 21-23—Show, Santa Ana, Cal.
January 23-30—Chicago show.
January 23-30—Montreal show.
January 23-30—Show, Portland, Ore.
January 25-30—Show, Buffalo, N. Y.
January 25-30—Show, Fall River, Mass.
January 26-30—Show, Tiffin, O.
January 30-February 6—Minneapolis show.
January 30-February 6—Show, Columbus.
February 1-6—Show, Louisville, Ky.
February 2-6—Show, Kalamazoo, Mich.
February 3-6—Show, St. Joseph, Mo.
February 4-6—Show, Marinette, Mich.
February 6-13—Show, Hartford, Conn.
February 8-13—Show, Toledo, O.
February 9-12—Show, Peoria, Ill.
February 8-15—Show, Kansas City, Mo.
February 9-12—Show, Eau Claire, Wis.
February 15-20—Show, Omaha, Neb.
February 15-20—Show, Grand Rapids, Mich.
February 15-20—Show, Tacoma, Wash.
February 23-27—Show, Ft. Dodge, Ia.
February 23-27—Show, Syracuse, N. Y.
February—Show, Rockford, Ill.
March—Show, Shelbyville, Ind.
March 6-13—Show, Boston, Mass.
March 8-13—Show, Des Moines, Ia.

CONTESTS

* February 22—Vanderbilt cup race, San Francisco, Cal.
* February 27—Grand prize road race, San Francisco, Cal.
March—Show, Shelbyville, Ind.
March 17—Road race, Venice, Cal.
* May 29—500-mile speedway race, Indianapolis, Ind.
June 9—200-mile race, Galesburg, Ill.
June 19—Chicago speedway race.
June 26—300-mile race, Sioux City, Ia.
August 20-21—Elgin road races.

* Sanctioned by A. A. A.

Among the Makers and Dealers

CAPITAL Stock Raised to $1,500,000.—A certificate has been filed with the secretary of state of Ohio, increasing the authorized capital of the McGraw Tire and Rubber Co., West Palestine, from $1,000,000 to $1,500,000.

Truck Company Changes Name—Papers have been filed with the secretary of state of Ohio changing the name of the Bowling Green Motor Car Co. to the Bowling Green Motor Truck Co. The company will make trucks exclusively.

Start Work on Tire Factory—The work of constructing a plant for the Toledo Ford Tire Co., at Findlay, O., has been started. It is announced that the foundations will be especially heavy in order to allow the addition of more stories later.

Beaver to Build Cars Soon—Frank McCrillis, manager of the Beaver State Motor Co., at Gresham, Ore., near Portland, will start active operations during January. A milling and boring machine has been installed recently, which will expedite the manufacture of the Beaver cars.

Romeo May Get Body Company—It is reported that if the citizens of Romeo, Mich., raise $25,000 for the erection of the plant, a motor car body manufacturing concern will locate there shortly. Lyman A. Holmes is to be the head of the new company in which he will invest $25,000, while the capital of the company is to be $100,000.

Radiator Maker Changes Name—The name of the Shotwell-Harris Co., Minneapolis, Minn., builder of radiators, has been changed to that of Shotwell-Hobart-Johnson Co. H. J. Shotwell is president of the concern; A. E. Johnson, vice-president and secretary; A. A. Hobart, treasurer.

Seek to Collect Accounts—Suit has been brought by the New Columbus Buggy Co., of Columbus, O., against the directors of the former Columbus Buggy Co. to collect $4,047.97 on accounts, claimed to have been transferred to the new company. The defendants are George W. Lattimer, George W. Bright, Edwin R. Sharp, Benson G. Watson and D. N. Postlewaite.

Plan to Form Fender Company—Plans have been prepared for the organization of the Automatic Safety Fender Co., of Ohio, with headquarters at Columbus. The company will have an authorized capital of $30,000 and will be licensed to manufacture the fender made by the Automatic Safety Fender Co., of Chicago. The Columbus company will manufacture for Ohio only.

Duplex May Leave Charlotte—It is rumored that the Duplex Power Car Co., manufacturer of the four-wheel drive 2-ton trucks, is contemplating moving from Charlotte, Mich., to another city in the state which has offered a large plant now available and guaranteed that the inhabitants will subscribe at least $50,000 towards the increase of the company's capital stock. The concern, which now employs only about 40 men, desired to expand as it has received many orders and must increase its production facilities.

New Factory for Bailey Company—The expansion of the business of the Bailey Mfg. Co., York, Pa., engaged in the manufacture of commercial car bodies, has necessitated the erection of a second plant and contracts have been let for the erection of a factory building at North Wales, near Philadelphia. The North Wales factory will be used for the manufacture of bodies for Vim commercial cars. The York company recently closed a contract whereby it is required to furnish $33,600 worth of bodies as soon as possible. The North Wales factory will be two and one-half stories in height, the main building 168 feet by 50 feet, with a wing 60 feet by 40 feet. It will be of concrete construction.

Capital Needed to Fill War Orders—The Lauth-Juergens Motor Car Co., Fremont, O., has filed an application with the secretary of state to increase its authorized capital from $150,000 to $250,000 in order to take care of increased orders for motor trucks from European countries for war purposes.

Racine Rubber Dividend Paid—The Racine Rubber Co. paid on January 2, the eleventh regular quarterly dividend of 1¾ per cent, on its preferred stock, which is 7 per cent cumulative. The company has just closed a most prosperous year, having made net earnings sufficient to pay its preferred dividends thirty times over, it is claimed. A 50 per cent stock dividend and 1½ per cent cash dividend also was paid on the common stock in November.

Olds Set New Shipment Record—According to Sales Manager J. V. Hall, of the Olds Motor Works, 624 per cent more cars were shipped during the 4 months from August 1 to December 1, 1914, than during the corresponding period of 1913. The increase credited to New York was 540 per cent larger than in 1913; the increase from Chicago 330 per cent; Los Angeles, Cal., showed an increase of 200 per cent; Detroit, 150 per cent. The sales in the state of Pennsylvania were 391 per cent greater; those in the state of California 417 per cent greater and Ohio's record was over 500 per cent better than in 1913.

Asks Receiver for Castings Company—Fred L. Hollweg, president and treasurer of the company, has brought suit in the superior court at Indianapolis asking for the appointment of a receiver for the Aluminum Castings Co. According to the complaint, the liabilities are $8,017.92 and there is not sufficient money on hand to conduct current business. The court is asked to authorize the receiver, if one is appointed, to fill orders on hand.

New Stations for Motor Car Service—The motor car equipment department of the Westinghouse Electric and Mfg. Co., with works near Pittsburgh, Pa., is extending its sales service arrangements and has opened the following new branch houses: New York, 250 West Fifty-fourth street; Cleveland, O., 2025 Euclid avenue; Detroit, Mich., Woodward avenue; Chicago, 2007 Michigan avenue, and Indianapolis, 427 North Meriden street. Similar stations will be opened soon in the principal cities on the Pacific coast.

Recent Incorporations

Albany, N. Y.—The Transport Tractor Co., to manufacture motor vehicles; capital stock $100,000; incorporators, A. W. Moffat, F. B. Stimson, F. J. Stimson.

Albany, N. Y.—The Economical Garage, capital stock $10,000; incorporators, P. J. Holdsworth, H. B. Miller, C. A. Miller.

Albany, N. Y.—E. Schoonmaker Co., capital stock $25,000; incorporators, H. I. Huber, L. N. Mansuy, E. Schoonmaker.

Albany, N. Y.—The Kay-See Motor Service Co., capital stock $15,000; incorporators, E. L. Marshall, A. E. Barger, H. Barton Parry.

Albany, N. Y.—The Helicloc Tire Co., capital stock $100,000; incorporators, T. H. Soulee, S. W. Rogers, I. E. Maginn.

Albany, N. Y.—Universal Safety Brake Co., capital stock $25,000; incorporators, S. Weisenberg, L. M. Bernefield, R. Bernefield, H. Waldman.

Albany, N. Y.—The Searle Unburstable Inner Tube Co., to manufacture inner tubes, tires, etc.; incorporators, G. F. Hall, A. Kilhorn, J. C. Thompson.

Augusta, Me.—The National United Service Co., capital stock $150,000.

Boston, Mass.—Rennex Mfg. Co., to manufacture accessories; capital stock $500,000; incorporators, J. A. Potter, M. H. Rennex, F. C. Rennex.

Bridgeport, Conn.—Exposition Motor Coach Co., capital stock $400,000; incorporators, D. P. Bergheimer, R. W. Gates, J. J. Gallagher.

Brooklyn, N. Y.—The Auto Towing & Supply Co., capital stock $1,500; incorporators, G. H. Seeth, W. F. Seeth, C. E. Hiscox.

Buffalo, N. Y.—Kay-See Motor Service Corp., capital stock $15,000; incorporators, H. B. Parry, A. E. Bargar, E. L. Marshall.

Buffalo, N. Y.—Buse-Patten Motor Car Co., capital stock $10,000; incorporators, G. Buse, G. G. Buse, E. A. Buse.

Cleveland, O.—The Gutman Tractor Co., to manufacture tractors; capital stock $10,000; incorporators, E. K. Hoy, L. M. Henges, B. A. Shatto, M. J. Kurka, O. D. Eshelman.

Cleveland, O.—The Allbaugh Motor Sales Co., to deal in motor cars and accessories; capital stock $10,000; incorporators, J. W. Allbaugh, C. S. Allbaugh, T. K. Allbaugh, W. A. Allbaugh, B. K. Allbaugh.

Columbus, O.—Sideney Auto Sales & Supply Co., capital stock $20,000; to deal in motor cars; incorporators, W. H. Persinger, W. L. Alton, H. E. Alton, B. H. Mirez and J. D. Barnes.

Columbus, O.—The Monarch Rubber Co., capital stock $1,000,000.

Defiance, O.—McCleary Garage Co., capital stock $20,000; incorporators, A. C. McCleary, D. W. Cook, D. A. Baker, W. J. Miller, E. R. Mallett.

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Detroit, Mich.—Consolidated Car Co., to manufacture and deal in motor cars; capital stock $100,000; incorporators, R. A. Palmer, M. J. Hammers, A. C. Knapp.

Detroit, Mich.—Wolverine Winter Top Co., capital stock $2,000; incorporators, J. E. Murphy, H. H. Creamer, G. F. Monahan.

Detroit, Mich.—F. H. Primeau Co., capital stock $10,000; incorporators, F. H. Primeau, John B. Primeau, John B. Primeau Jr.

Fargo, N. D.—Red River Automobile Supply Co., capital stock $25,000; incorporators, H. E. Day, R. E. Robinson.

Flint, Mich.—Dort Motor Car Co., capital stock $500,000.

Hopewell, N. Y.—Clove Branch Shop, capital stock $5,000; incorporators, W. A. Martin, Frank Schier, L. M. Woodruff.

Indianapolis, Ind.—Mutual Motors Co., to manufacture motor cars; capital stock $1,000,000; incorporators, B. M. DeLamater, J. I. Handley, T. A. Campbell, W. R. Smith, T. E. Barkworth.

Indianapolis, Ind.—The Cole Sales Co., capital stock $10,000; incorporators, J. F. Minthorne, H. C. Lathrop, A. P. Conklin.

Jackson, Mich.—The Mutual Motors Co., to manufacture motor cars; capital stock, $1,000,000; incorporators, T. E. Campbell, W. S. Kessler, W. R. Smith, B. M. Delameter, J. I. Handley.

Kittery, Me.—Monarch Sultoned Tire Co., capital stock $500,000; incorporators, Horace Mitchell, H. A. Paul.

Louisville, Ky.—The Grant Manufacturing Co., to manufacture chemicals and motor car supplies; capital stock $9,000; incorporators, A. C. Grant, R. E. Shinns, J. L. Lenihan.

Milwaukee, Wis.—Wells Garage Co., capital stock $10,000; incorporators, C. Bublin, E. A. DeSarnelle, S. Carroll.

New Castle, Pa.—New Castle Rubber Co., to manufacture tires; incorporators, J. S. Wilson, E. N. Ohl, James D. Rhodes, A. C. Hoyt, C. H. Bolton.

New York—The Heliclox Tire Co., to manufacture puncture-proof armor for tires; capital stock $100,000; incorporators, T. H. Soule, S. W. Rogers, I. E. Maginn.

New York—Economical Garage, capital stock $10,000; incorporators, H. B. Miller, C. A. Miller.

New York—Gillett-Johnson Co., capital stock $5,000; incorporators, F. D. Gillett, C. L. G. Johnson, A. J. Johnson.

North Hempstead, N. Y.—Collins Auto Renting Co., capital stock $1,000; incorporators, H. M. Day, H. L. Collins and C. R. Collins.

Sidney, O.—Sidney Auto Sales Co., to deal in motor cars and accessories; capital stock $20,000; incorporators, W. H. Persinger, W. L. Allton, E. L. Allton, B. H. Mires, J. D. Barnes.

Trenton, N. J.—The International Wire Tire Co., to manufacture motor cars, tires, and rims; capital stock $1,000,000; incorporators, J. S. Lyones, G. T. Brown, T. A. Zukoski.

Trenton, N. J.—Johnson Rose Auto Co., capital stock $10,000; incorporators, N. Johnson, P. A. Rose, J. Kershaw, B. F. Savage.

Brief Business Announcements

FENTON, Mich.—A garage has been opened here by Charles A. Sutliff.

Boyne City, Mich.—John Streeter and Loyal Newville have started a garage business here under the name of Pine Lake Garage.

Schleisingerville, Wis.—The partnership of Geller & Winberg has been dissolved and Arthur R. Winberg will conduct the garage in the future.

Ypsilanti, Mich.—The Michigan Crown Fender Co., is a new concern which has located at Cross and River streets. Crown fenders are made and delivery has started.

Troy, O.—J. E. Schneider, formerly secretary and treasurer of the Speedwell Motor Car Co., has accepted the position of purchasing agent with the Troy Carriage Sunshade Co.

Buffalo, N. Y.—A branch has been opened here, under the management of Herbert C. Faust, at 20 Goodrich street, by the H. C. Faust Co., Philadelphia, Pa., manufacturer of the Panther spark plugs.

St. Johns, Mich.—The Moss Garage has been opened on Brush and Higham streets. It is one of the largest in this section of the state and is the home of the Maxwell and Studebaker.

Cleveland, O.—D. C. Hathaway, until recently with the local branch of the Firestone Tire and Rubber Co., has been appointed manager of the solid tire department of the local agency of the Kelly-Springfield Tire Co.

Clare, Mich.—J. T. Brown has purchased the local garage business of Alfred Boe.

Mt. Pleasant, Mich.—Floyd H. Johnson has opened a garage on West Broadway. He handles the Ford cars.

Columbus, O.—The final dividend of 12 per cent has been authorized by the court in the bankruptcy case of the Barndt-Johnson Auto Supply Co., of Columbus.

Roscommon, Mich.—A garage will be opened here the latter part of the month by J. W. Zeahringer, of Chicago, and C. E. Doose, of Evanston, Ill.

Cuyahoga Falls, O.—The Marathon Tire and Rubber Co. has appointed, as its agent for the island of Cuba, G. Miquez y cia, located at Havanna.

Cleveland, O.—H. B. Young has been appointed manager of the local branch of the Chicago Pneumatic Tool Co., and will have charge of both the commercial car and tool departments. Young has been identified of late with the local distributor of the Velie cars.

Denver, Colo.—George H. Maines, recently sales manager for the Chalmers-Syracuse Co., Syracuse, N. Y., distributor of the Chalmers and Chevrolet cars, has just located in Denver and gone into partnership with his brother, Harry E. Maines, Colorado and New Mexico distributor of the Chevrolet and Monroe.

Grand Rapids, Mich.—The Auto Tire and Vulcanizing Co., has taken the local agency for Kelly-Springfield tires.

Fort Worth, Tex.—T. Wheeler, who was district sales manager of the Chalmers Motor Co., is now general manager of the Bryant Machinery Co., of this city, which will handle the Chalmers cars.

Grand Rapids, Mich.—The firm of Vanden Berg & Vaughan has been organized by Melbourne VandenBerg and C. E. Vaughan who were formerly associated with the local Cadillac agency They will do a general repair business and also may take the agency for a low-priced car.

Joliet, Ill.—Suit for $2,000 damages has been filed by F. A. Mueller, of Andres, Ill., against the Ford Motor Co. He alleges that after giving him a contract for selling cars in and around West Peotone, the company cancelled the contract and gave the agency to another.

New York—John V. Mowe, 7 years Detroit manager for the Firestone Tire and Rubber Co., and lately representative at large for the Goodyear Tire and Rubber Co., has been appointed assistant general sales manager of the Kelly-Springfield Tire Co., New York. Mr. Mowe will make his headquarters in Detroit.

Recent Agencies Appointed by Motor Car Manufacturers

PASSENGER CARS

Town	Agent	Make
Bay City, Mich.	Oswald Auto Co.	Pullman
Buffalo, N. Y.	Poppenberg Motor Car Co.	Pullman
Battle Creek, Mich.	L. S. Knowles	Overland
Boston, Mass.	Leo W. Schegelmilch	Pullman
Cincinnati, O.	Pullman Motor Car Co.	Pullman
Cleveland, O.	Oakland Motor Co.	Oakland
Cleveland, O.	Windemere-Euclid Garage	Oldsmobile
Cleveland, O.	M. D. Coats	Pullman
Cleveland, O.	M. D. Coats	Detroiter
Cleveland, O.	A. R. Davis Motor Car Co.	Studebaker
Cleveland, O.	Stark Motor Car Co.	Allen
Circleville, O.	G. L. Schlear	Hupmobile
Circleville, O.	G. L. Schlear	Cadillac
Clinton, Wis.	Terwilliger & Son	Buick
Clinton, Wis.	Terwilliger & McCommons	Dodge
Galion, O.	Green & Snyder	Pullman
Cobleskill, N. Y.	W. Harold Fox	Pullman
Chambersburg, Pa.	W. L. Forney	Pullman
Cedar Rapids, Ia.	Mohrbacher & Co.	Pullman
Charlotte, Mich.	Barber Bros.	Ford
Denver, Colo.	Wm. Thorney Auto Co.	Krit
Denver, Colo.	E. F. Ervin	Pullman
Dover, N. H.	Granite State Garage	Pullman
Escanaba, Mich.	Earl J. French	Overland
Fallon, Mont.	Shultz & Toppins	Pullman
Fresno, Cal.	John E. Finney	Oakland
Hulsa, Okla.	Okla-Haynes Auto Co.	Haynes
Houston, Tex.	Magnolia Motor Sales Corp.	Pullman
Hughsville, Pa.	Shipman & Bartlow	Pullman
Harrisburg, Pa.	Bentz-Landis Auto Co.	Pullman
Jacksonville, Fla.	Sinkler Automobile Co.	Dodge
Kansas City, Mo.	I. D. McCrew	Pullman
Lansing, Mich.	Union Garage	Cadillac
Lansing, Mich.	Union Garage	Oldsmobile
Lainsburg, Mich.	E. E. Leland	Oldsmobile
Littlestown, Pa.	L. M. Alleman	Pullman
Los Angeles, Cal.	Aston Motor Car Co.	Pullman
LaCrosse, Wis.	O. H. Hosmer	Pullman
Lestershire, N. Y.	B. W. Livingston & Sons	Pullman
Lancaster, Pa.	Butzer Bros.	Pullman
Milwaukee, Wis.	Wait Automobile Co.	Velie
Milwaukee, Wis.	Wait Automobile Co.	Moline
Milwaukee, Wis.	Milwaukee Motor Sales Co.	Detroiter
Milwaukee, Wis.	Durbin-Thomson Co., Ltd.	Moon
Milwaukee, Wis.	Intersection Garage Co.	Abbott
Milwaukee, Wis.	Wells Garage Co.	Chevrolet
Milwaukee, Wis.	Wells Garage Co.	Monroe
Minneapolis, Minn.	A. M. Choate Auto Co.	Pullman
Manchester, N. H.	H. L. Lamprey	Pullman
Middleburg, Pa.	R. P. Haines	Pullman
New Bremen, O.	F. N. Allen & Son	Pullman
New York City	Pullman Sales Co.	Pullman
Omaha, Neb.	The T. G. Northwall Co.	Pullman
Omaha, Neb.	Murphy-O'Brien Co.	Paige
Oneonta, N. Y.	L. H. Townsend	Pullman
Philadelphia, Pa.	Standard Motor Car Co.	Pullman
Providence, R. I.	Pearson Bros.	Pullman
Potsdam, N. Y.	Dr. Geo. P. Lyman	Oldsmobile
Rock Springs, Wyo.	West Central Auto Co.	Oldsmobile
Reading, Pa.	Motor Supplies Co.	Pullman
Seattle, Wash.	Mack and Farnsworth	Oakland
Seattle, Wash.	Parker Motor Car Co.	Pullman
St. George, Utah	E. H. Snow	Oldsmobile
St. Louis, Mo.	Ideal Motor Sales Co.	Pullman
Springfield, O.	B. H. Brunton	Pullman
San Francisco, Ca.	Stewart Auto Sales Co.	Pullman
Tucson, Ariz.	Hankins & Martin	Maxwell
Toledo, Neb.	Harry Francke	Argo
Walla Walla, Wash.	T. S. Steele	Buick
Webberville, Mich.	Leslie Ling	Oldsmobile
Worcester, Mass.	Peter Welin	Pullman
Wichita, Kan.	Regal Motor Co.	Pullman
Washington, D. C.	W. P. Barnhart & Co.	Pullman

COMMERCIAL CARS

Augusta, Ga.	Speth Garage & Sales Co.	Koehler
Bloomington, Ill.	C. U. Williams Son & Co.	Koehler
Denver, Colo.	E. M. Jackson	Walker Electric
Greencastle, Pa.	Lininger's Garage	Koehler
Hartford, Conn.	The Keeney Garage	G. M. C.
Hartford, Conn.	Edward S. Clark	Krebs
Southbridge, Mass.	Weld & Beck	Koehler

REG. U. S. PAT. OFFICE

Largest MAGNETO Contract Ever Placed

OVERLAND ignition for 1916 will be exclusively DIXIE

The Willys-Overland Co. has placed the largest magneto order ever given

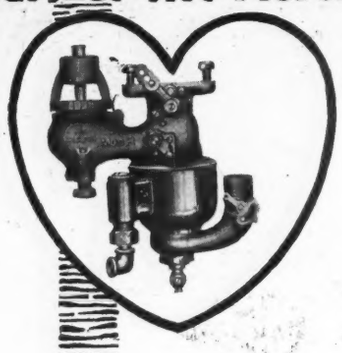
For their entire 1916 output

Not battery ignition—not 19th century magneto, but the 20th century DIXIE

SPLITDORF ELECTRICAL COMPANY
NEWARK, NEW JERSEY

SCHEBLER

The Heart of the Automobile



Schebler-Equipped Stutz Wins San Diego Exposition 305-Mile Road Race.

In the first important road race of the new year Earl Cooper, driving a SCHEBLER-equipped Stutz, won first place against a field of 18 starters.

Cooper's time—65.35 miles per hour—over the hazardous Point Loma Course, was remarkable considering the difficult grades encountered.

It is noteworthy that SCHEBLER Carburetors have won more road races during the last ten years than any other make of American carburetor. Road racing puts a carburetor to a CONCENTRATED real service test. Road racing proves the EVERY-DAY worth of a carburetor as nothing else can.

SCHEBLER Carburetors are not built for racing purposes. They excel on the race course simply because they meet ordinary service conditions SUPERLATIVELY.

Put a SCHEBLER on your old car—demand one on your new car.

See Us at The Chicago Show,
Coliseum Gallery, Space 22

WHEELER & SCHEBLER
INDIANAPOLIS INDIANA

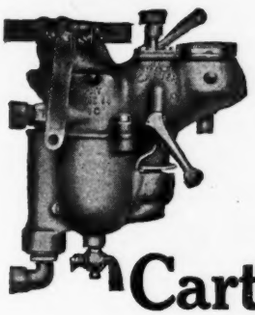
A Tremendous Tribute to the Centrifugal Speedometer

The superiority of the Centrifugal Speedometer is settled. The largest automobile manufacturers have decided it. During 1915 more cars will come from their factories equipped with Centrifugal Speedometers than with any other type. And the Jones Centrifugal Speedometer will predominate!

Jones Speedometer
Centrifugal Principle

The Centrifugal Principle is right—fundamentally. There is no other speedometer principle that insures so high a degree of accuracy, or that is so completely beyond the influence of heat, cold or change of elevation. The Centrifugal Principle is a positive means of recording true speed, absolutely and permanently reliable. The Jones Speedometer is the utilization of the Centrifugal Principle at its highest and best efficiency.

When you buy a speedometer, buy a Jones. When you buy a car, look to see that the Jones Speedometer is on it.



More Power with Less Fuel

A Carter Carburetor vaporizes your fuel so thoroughly that every atom delivers the utmost power. Few carburetors do this, and none to the extent of the Carter. The Carter Multiple-Jet principle is super-efficient. We are prepared to prove this to YOU.

Carter Carburetor
Multiple-Jet

You can have the Carter installed on your car for thirty days' trial. If at the expiration of this period you are not getting more power, with less fuel, and wonderfully increased flexibility besides, you can return the Carter and we will return the purchase price. Sounds fair, doesn't it? And it *is* fair. We are willing to thus stake our reputation on the Carter Carburetor because we know it to be a highly superior instrument, believe in it, and back it up with more than words.

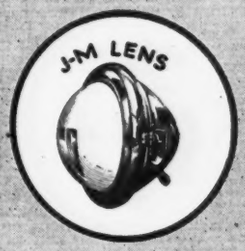
Made in sizes for all cars. Special assembly for Ford cars at $17, complete. Any J-M Service Station will make installation. See your dealer today. Write for booklets.

See the Chicago J-M Accessory Show—at 1428 Michigan Avenue January 23 to 30—same week as Auto Show

2075

JOHNS-MANVILLE SERVICE
COVERS THE CONTINENT

One Firm
One Service
One Guarantee
back of every
J-M Accessory



H·W·JOHNS-MANVILLE CO·

Akron, Albany, Atlanta, Baltimore, Birmingham, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Columbus, Dallas, Dayton, Denver, Detroit, Duluth, Galveston, Houghton, Houston, Indianapolis, Kansas City, Los Angeles, Louisville, Memphis, Milwaukee, Minneapolis, Newark, N. J., New Orleans, New York, Omaha, Philadelphia, Pittsburgh, Portland, Ore., Rochester, St. Louis, St. Paul, Salt Lake City, San Francisco, Seattle, Syracuse, Toledo, Washington, Wilkes-Barre, Youngstown

THE CANADIAN H. W. JOHNS-MANVILLE CO., LIMITED Toronto Montreal Winnipeg Vancouver

BANKRUPTCY SALE

ALL ASSETS OF THE

LOZIER MOTOR COMPANY

WILL BE SOLD AT

PUBLIC AUCTION

On FEBRUARY 4th, 1915, at TEN A. M.

IN THE UNITED STATES CIRCUIT COURT ROOM, POSTOFFICE BUILDING, DETROIT, MICHIGAN

This Company manufactured the well-known LOZIER Automobiles, and its assets consist of two plants, one located at Plattsburg, New York, and the other at Detroit, Michigan. Together they are fully equipped for the production of complete automobiles.

There is on hand a large stock of automobile material and supplies, a great deal of which material is of standard make. A number of cars are in the process of manufacture and finished cars could be produced within thirty days after the plant was started in operation.

Detroit, Michigan

Property consists of a modern reinforced concrete, fireproof factory, situated on Mack Avenue, corner of the Detroit Terminal Railroad, and contains 250,000 square feet of floor space, and includes a modern electric power plant, sprinkler system, elevators, heating and lighting system and other up-to-date building equipment.

The land occupied by the Buildings and Yards comprises 12.10 acres. Vacant land adjoining the plant and located along the railroad track, consisting of 49.298 acres, will be offered separate from the plant. This land is suitable for manufacturing plants or subdivisions, has an exceptionally fine location and is a rare investment opportunity in itself.

We will, also, sell in appropriate parcels all of the Company's modern machinery, office and factory furniture and fixtures, manufacturing equipment and tools, together with materials and supplies, raw and in process for Lozier four cylinder and six cylinder automobiles.

The Automobile stock valued at over two million dollars, consists of clean automobile merchandise, much of which is practically in finished shape, and a rare opportunity is presented to immediately resume the manufacture of this most popular line of high grade cars.

There is a well assorted stock of repair and service parts for all Lozier models.

In connection with the merchandise and service parts we will also sell patents, patterns, special tools and all rights to the trade name and good will, including the right to receive mail, full list of customers, trade connections, etc., etc.

We will also offer all accounts and notes receivable of The Company, embracing several hundred thousand dollars of accounts and bills.

Plattsburg, N. Y.

This property consists of a modern brick manufacturing plant of approximately 145,000 square feet of floor space.

The land upon which the plant is situated and adjoining land owned by the Company consists of approximately 327 acres, of which approximately 310 acres is very valuable farm land, not occupied by buildings, and may be offered as a separate parcel.

This plant was for several years the only plant used by the Lozier Motor Company as a complete manufacturing plant, and is equipped with modern Brass, Bronze, and Aluminum and Grey Iron Foundries, Machine Shop, Assembling Shop, Tool Shop, and Pattern shop and other departments desirable in a complete plant unit.

The machinery, equipment, tools, etc., are modern and there is a large stock of valuable raw material, metals, automobile parts and accessories in the various stages of manufacture.

The labor rates are much lower than in large cities, and shipping facilities are excellent.

We will sell as a separate parcel, a fully assorted stock of parts for Marine engines previously manufactured by the Lozier Company, together with all drawings, patterns, sales records and other data and equipment pertaining to same, a complete business in itself.

New York City

A full, well assorted stock of Service repair parts for Lozier automobiles, inventory value approximately $16,000.00.

San Francisco, Cal.

A full, well assorted stock of Service repair parts for Lozier automobiles, inventory value approximately $22,000.00.

Chicago, Ill.

A full, well assorted stock of Service repair parts for Lozier automobiles, inventory value approximately $3,000.00.

Philadelphia, Pa.

A full, well assorted stock of Service repair parts for Lozier automobiles, inventory value approximately $7,000.00.

Long Island City

Property, a valuable tract of unimproved real estate situated at the corner of Thompson and Hulst streets. The dimensions are 100 ft. by 150 ft.

Westchester, N.Y. State

Property, consisting of buildings and Power Equipment.

The assets of this Company, which have been briefly mentioned, were valued by the Company at more than $4,000,000, and it is our intention to offer these assets in parcels and as a whole.

For full information as to how the property will be offered and for the detail of each parcel, communicate with us at our office.

A detailed inventory may be seen at the office of either the Detroit or Plattsburg plants or at our office in the Penobscot Building, Detroit, Michigan.

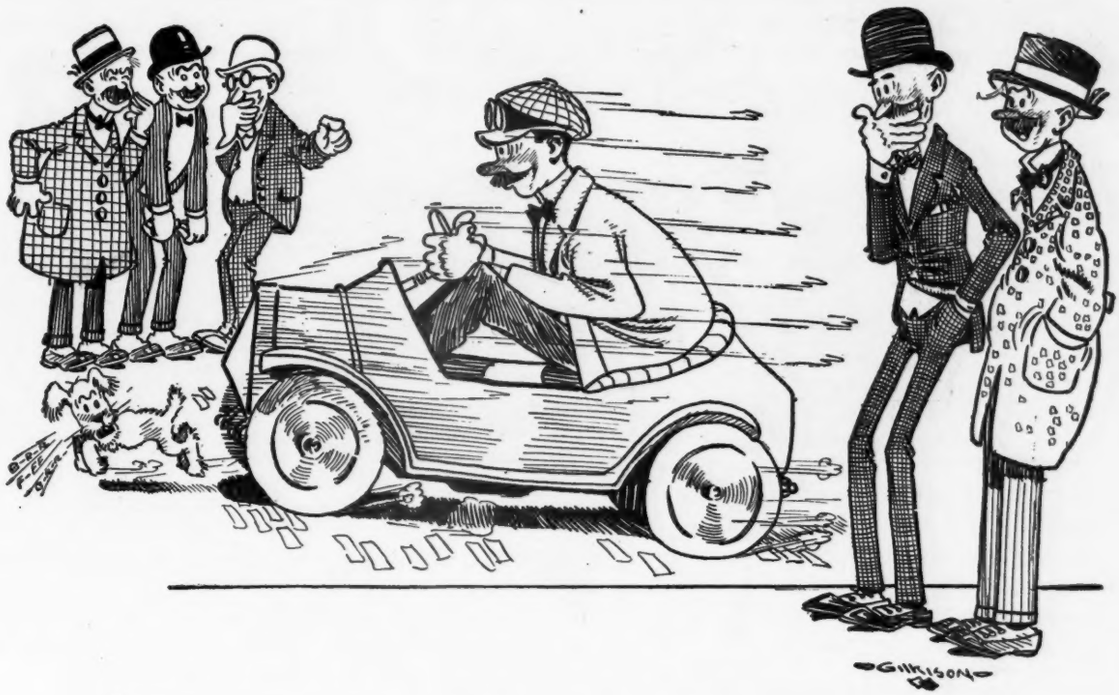
We will reserve the right to reject any and all bids and withdraw any property from the sale. All sales will be reported to Court for confirmation the following day, February 5th, 1915.

Certified checks of not less than 10 per cent of the amounts bid, or a maximum of $25,000.00 is required from all successful bidders at the time of sale.

If you wish to submit a bid and cannot be present at the time of sale, you may mail one to us in a sealed envelope, and we will open it and make the bid for you upon date of sale.

Guaranteed Bids for Liquidation Will Be Considered

DETROIT TRUST CO., Trustee, Detroit, Mich.



You Can't Please Everybody

If you can afford to have your car built to order, you can have it the size of a freight car or a baby's go-cart.

But manufacturers don't build cars to suit a crank here and there—they have to satisfy the majority.

It's the Same Way in Batteries

We *could* make Willard Batteries bigger and heavier—but why make a pleasure car do the work of a truck?

We *could* make them of such expensive materials, such tremendous capacity and long life that only millionaires could afford to buy them.

And we *could* make them a whole lot cheaper—and have them go to pieces like other cheap batteries.

But 85% of the makers of electrically equipped cars prefer the Willard as it is—the only battery that gives the right average of cost, weight and long life

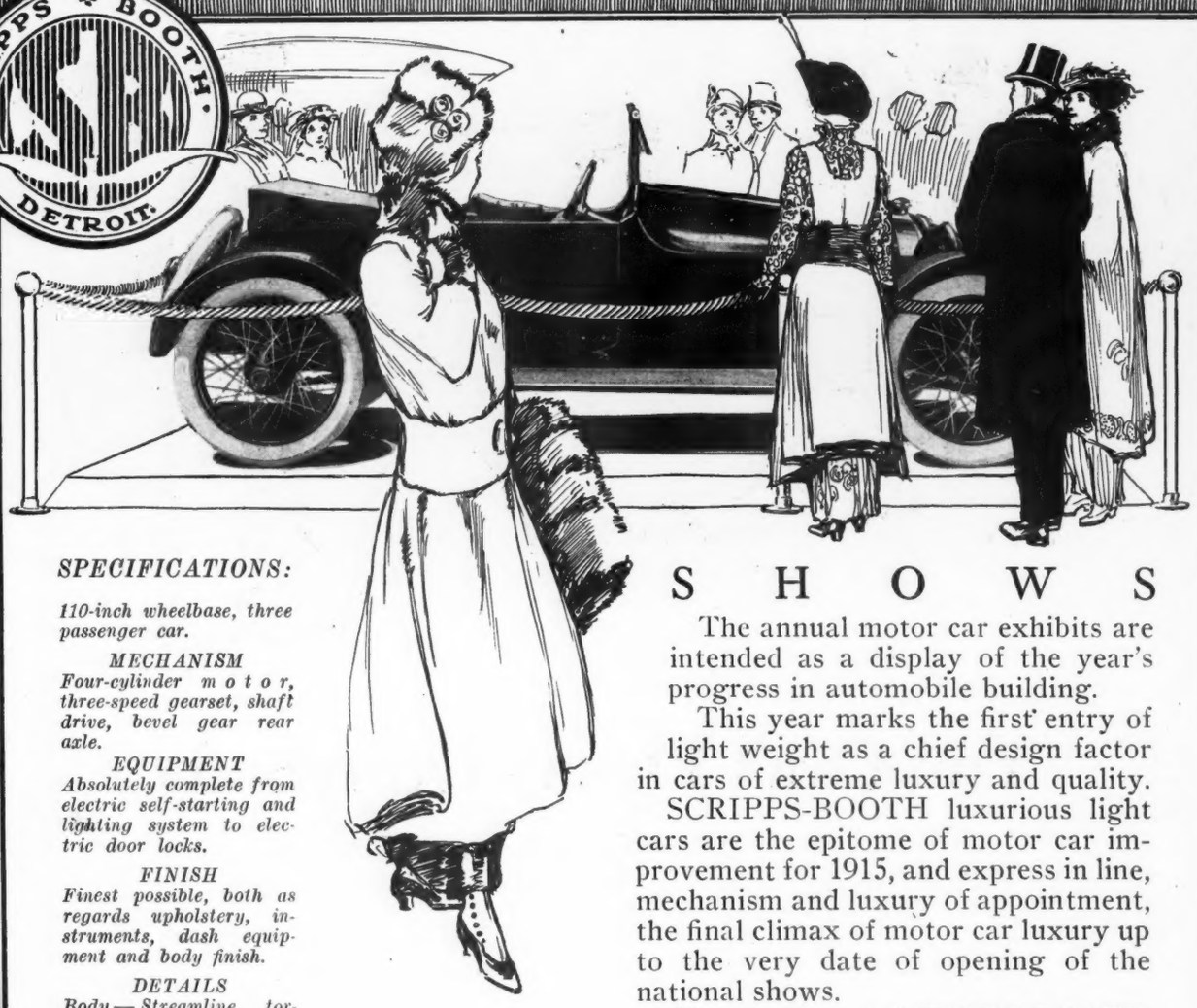
LBA STORAGE BATTERY Willard LBA

Willard Storage Battery Company

Cleveland, Ohio

New York Branch: 228-230 W. 58th St. **Detroit Branch: 736-38-40 Woodward Ave.**
Chicago Branch: 2524-30 S. Wabash Ave. **San Francisco Branch: 821 Monadnock Bldg.**
Indianapolis Branch: 318 North Illinois Street

Service Stations in All Principal Cities in the United States, Canada and Mexico



SHOWS

The annual motor car exhibits are intended as a display of the year's progress in automobile building.

This year marks the first entry of light weight as a chief design factor in cars of extreme luxury and quality.

SCRIPPS-BOOTH luxurious light cars are the epitome of motor car improvement for 1915, and express in line, mechanism and luxury of appointment, the final climax of motor car luxury up to the very date of opening of the national shows.

The display of SCRIPPS-BOOTH cars at New York and Chicago will set a better standard of luxurious motor car building than has heretofore been seen in any automobile exhibition in America.

SPECIFICATIONS:

110-inch wheelbase, three passenger car.

MECHANISM

Four-cylinder motor, three-speed gearset, shaft drive, bevel gear rear axle.

EQUIPMENT

Absolutely complete from electric self-starting and lighting system to electric door locks.

FINISH

Finest possible, both as regards upholstery, instruments, dash equipment and body finish.

DETAILS

Body — Streamline, torpedo stern, highest grade blue-black finish, domed fenders. Upholstery, finest quality long-grain buffed leather. Cowl dash instruments; sight feed oiler, lighting and dimming switches, starting strangler, starting and ignition switch, flush type speedometer, generator indicator, shroud light and foot space light.

WHEELS

Five Houk, triple-laced detachable wire, 30x3½ inches, wide hubs.

AXLE

Rear, full-floating, annular bearings throughout. Bevel drive. Ball bearing universal joints on the Kardan shaft. All gears and shafts 3½% nickel steel. Drive shaft tubular.

MOTOR

Sterling, valve-in-head type, high speed, gearset in unit, pump feed oiling with sight feed on dash, 2⅞ bore, 4-inch stroke, four-cylinder, water cooled. Develops 18 horsepower. Fitted with Zenith carburetor and Atwater-Kent automatic spark advance, connected with starter generator system.

STARTING

Bijur single unit electric, connected by silent chain, operated by locking dash switch.

SPECIFICATIONS:

SPRINGS

Front, semi-elliptic with over-slung frame. Rear, floating cantilever.

EQUIPMENT

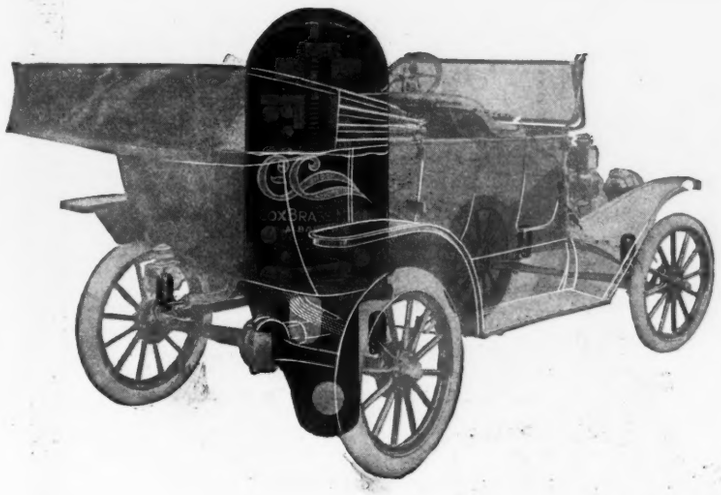
Silk mohair top with side curtains, rain vision plate glass windshield, electric door lock, Klaxet horn, full tool equipment, jack. Luggage space at the rear large enough for two suitcases and tools. Spare Houk wheel, tire and tube on all cars.

FEATURES

Klaxet button in center of steering wheel cannot be operated when ignition switch is off, eliminating miscellaneous horn blowing while the car is standing.
No projecting handles or slots in the doors. Electric door locks are operated by pressing a small push button.

SCRIPPS-BOOTH COMPANY, DETROIT, MICH.

C C SHOCK ABSORBER



A new society limited to Ford owners

And that "The Society for the Prevention of Cruelty to Fords."

Provided you have a Ford your initiation is $8.00 for a life membership and your badge the C C Shock Absorber.

The C C Shock Absorber for Ford cars, the most efficient device designed for the purpose, will save your Ford many times its cost in decreased tire, fuel and repair bills—to say nothing of the riding comfort you will enjoy.

The C C is the logical development of unusually fortunate conditions.

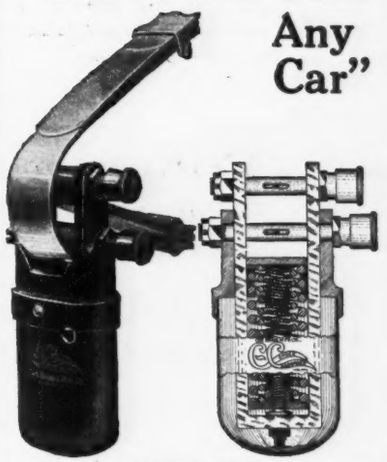
We have been successfully manufacturing metal specialties for over forty years, five years of which we have devoted to the shock absorber problem. Thousands of the world's highest priced and heaviest cars are today equipped with our famous Coxajusto shock absorber.

This experience plus our excellent manufacturing facilities has enabled us to turn out this highly efficient C C and at a price commensurate with the Ford cost.

No longer need you sacrifice your comfort and your Ford.

Go to your dealer today and have him attach a full set of four while you wait.

"The New C-C for Any Car"



The new universal C-C is the masterpiece of shock absorption construction. It is our supreme effort after 40 years of manufacturing experience and we are proud to put the Cox trade mark (the guarantee of absolute satisfaction) upon it. Easily applicable to any car.

Price, $10.00 per set complete.

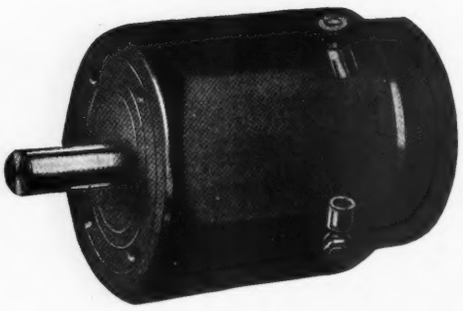
8.00 for set of four

COX BRASS MFG. CO.
ALBANY, NEW YORK

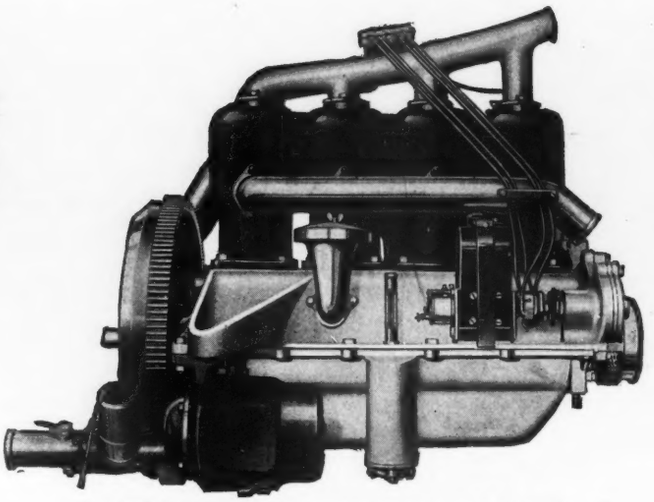
BRANCHES:
1777 Broadway, New York City
2637 Michigan Ave., Chicago, Ill.

4.50 for set of two

A Built-to-Order Starter



The AUTO-LITE Model M. C. starting motor, weighing only 30 pounds, is capable of cranking a 4½ x 5 four-cylinder engine of sixty pounds compression at 185 R. P. M. with NO intermediate gear reduction. The octagon shape gives many advantages not possessed by either square or round motors.



The AUTO-LITE M. C. starting motor installed on the new four-cylinder Model 80 Overland.

THE only practical way to have an electric starter on your car is to buy a car equipped with one. The starter must be an integral part of the car to be truly effective.

The AUTO-LITE starting system is standard equipment on more than 100,000 of this season's automobiles.

The AUTO-LITE starting system is designed and built especially for each car with which it is supplied. Its wonderful adaptability makes application exceedingly simple. This is one of the many reasons for AUTO-LITE popularity with car manufacturers.

The Electric Auto-Lite Company

Home Office and Factory: Toledo, Ohio

New York **Detroit** **Kansas City** **San Francisco**

Electric Auto-Lite

STARTING – LIGHTING – IGNITION

New Departure Ball Bearings

American Made for American Trade

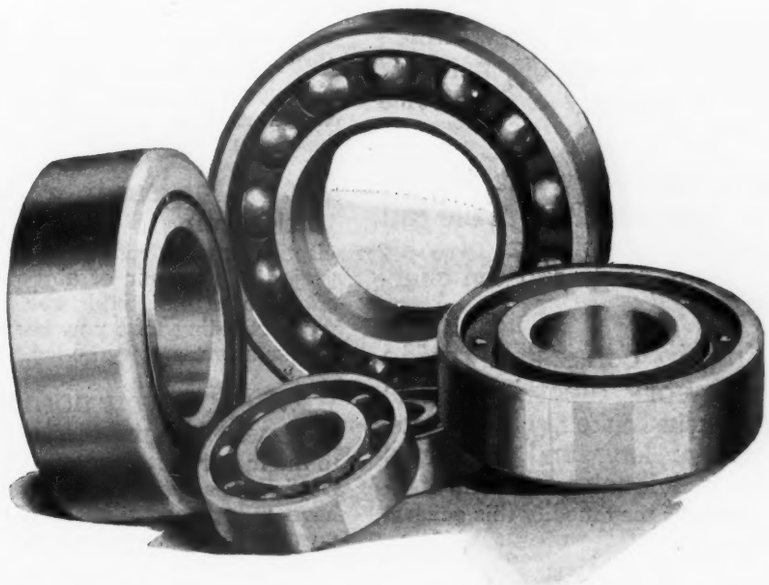
ARE immediately available in Four Types and a wide range of sizes.

The American Motor Car Manufacturer—user of anti-friction bearings, is assured in this line of New Departures, a dependable source of supply Guaranteed as to Quality—Quantity and Delivery.

The New Departure Mfg. Co.

Bristol, Conn., U. S. A.

Western Branch:
1016-17 Ford Bldg.
Detroit, Michigan

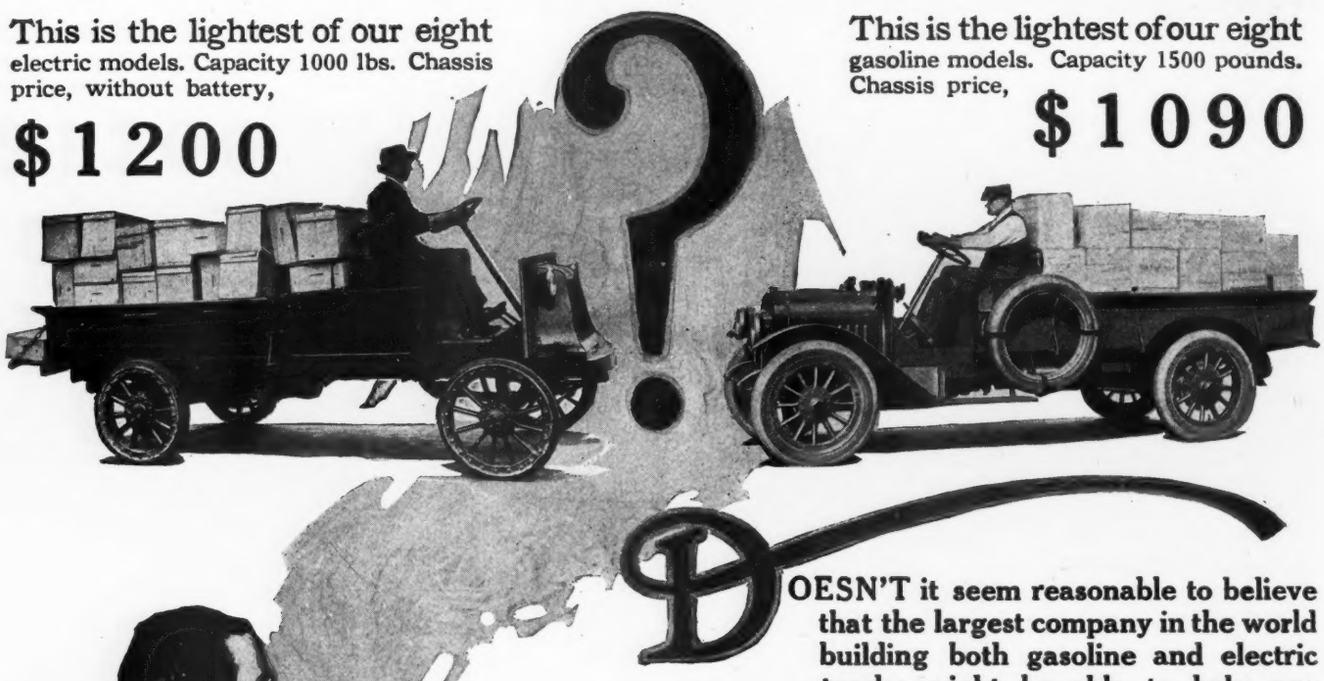


This is the lightest of our eight electric models. Capacity 1000 lbs. Chassis price, without battery,

$1200

This is the lightest of our eight gasoline models. Capacity 1500 pounds. Chassis price,

$1090



DOESN'T it seem reasonable to believe that the largest company in the world building both gasoline and electric trucks might be able to help you straighten out your delivery and haulage problems? If it does strike you that way—write us to-day.

GMC
GENERAL MOTORS COMPANY
TRUCKS
Gasoline *Electric*

Experienced operators of power vehicles know that motor trucks pay big returns on the investment only when they fit the service in which they are used.

Your natural question is "what trucks will best fit ***my*** business?" This all depends on the length and tonnage of your hauls, the nature of your roads and the character of your work.

Generally speaking, in congested traffic and frequent stop work electric trucks excel, while gasoline trucks make the best showing when the hauls are long and the stops relatively few. The individual conditions surrounding ***your*** work, however, may modify this general rule.

In answering your important question "what trucks are best for me?" doesn't it seem reasonable to believe that the largest company in the world building both gasoline and electric trucks might be of some assistance?

As the largest manufacturers of gasoline trucks from 1500 lbs. to 5 tons capacity, and electric trucks from 1000 lbs. to 6 tons, we have no prejudice in favor of any particular truck. We can afford to be unbiased in our advice, even to the point of recommending that you keep your horses, should that course seem best in the light of all the facts.

It will cost you nothing to get the honest judgment of our practical transportation men as to the motor truck equipment that will serve you best. Outline what you would like to accomplish and we will have a representative advise with you personally, or write you fully as you prefer.

DEALERS: Before you decide what motor truck you will handle send for our book, "Introducing the New Member"

GENERAL MOTORS TRUCK COMPANY

Direct Factory Branches:
Philadelphia, St. Louis, Kansas City, San Francisco

One of the Units of General Motors Company
PONTIAC MICHIGAN

Direct Factory Branches
New York, Detroit, Boston, Chicago

WARNER

"THE RECOGNIZED STANDARD"

Bob Burman Smashes World's Records Using Warner Gear Co. Gears.

DAY LETTER

THE WESTERN UNION TELEGRAPH COMPANY

25,000 OFFICES IN AMERICA CABLE SERVICE TO ALL THE WORLD

THEO. N. VAIL, PRESIDENT SELVIDERE BROOKS, GENERAL MANAGER

RECEIVED AT

NM-ED-OK-33 COLLECT
LOS ANGELES, CAL. 1-4-15.

WARNER GEAR CO.
MUNCIE, IND.

TODAY, I DEFEATED BARNEY OLDFIELD FOR THE SECOND TIME USING WARNER DRIVE GEARS ON MY REAR AXLE. THEY ARE CERTAINLY WORKING FINE. I BROKE ALL WORLDS RECORDS FROM TEN MILES TO FIFTY.

BOB BURMAN.

V-S
MR SIMPSON.
822 A.M.

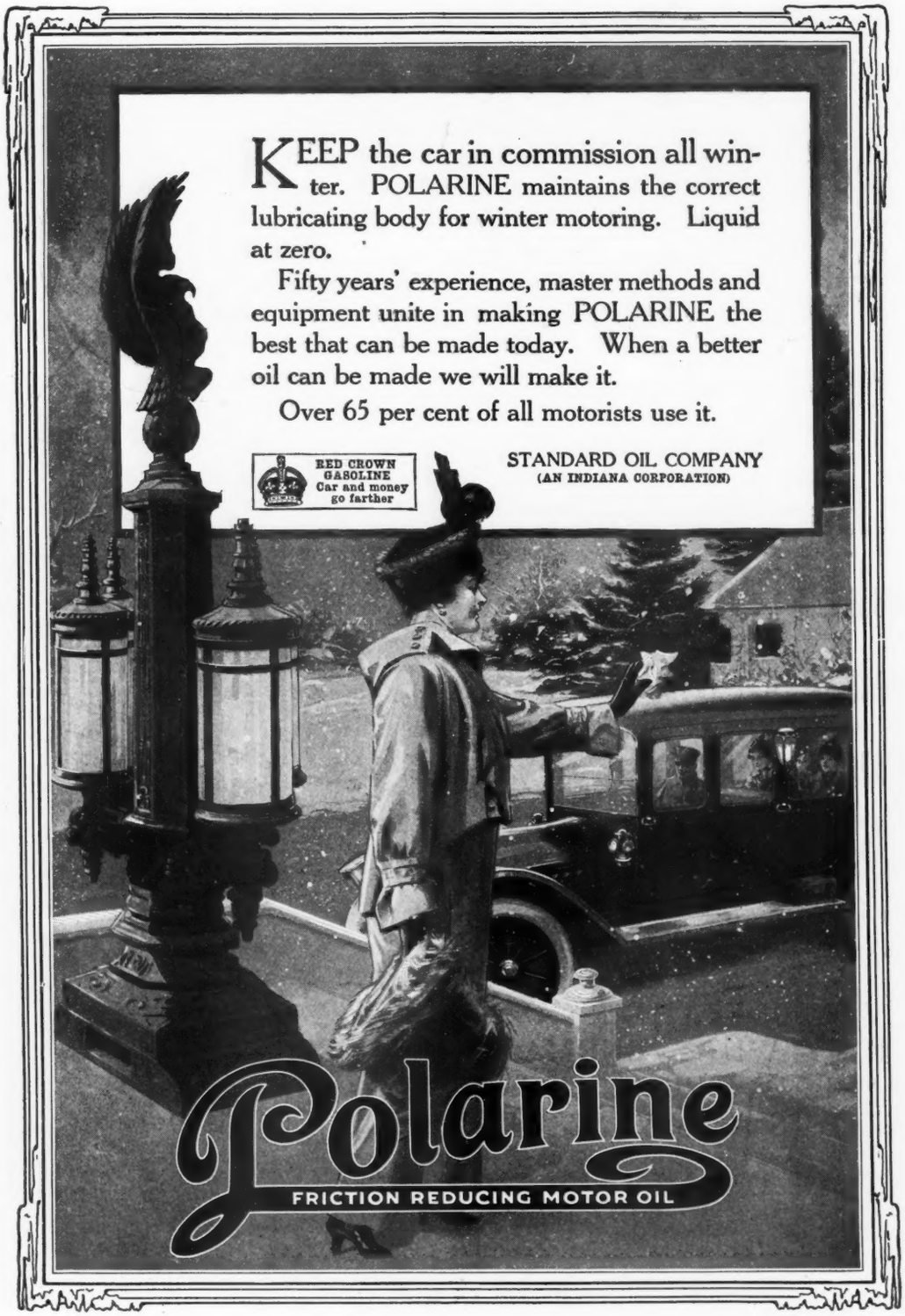
WARNER GEARS DECISIVELY PROVE THEIR SUPERIORITY WHEN BURMAN AT LOS ANGELES, JANUARY 3rd, IN HIS SPEEDY PEUGEOT, TAKES SECOND ONE FROM OLDFIELD AND BOOSTS ALL WORLD'S RECORDS FROM 10 TO 50 MILES.

WARNER GEARS ARE ALL BUILT TO GIVE THIS SERVICE AND THEY GIVE IT—EVERY DAY.

"THE ORIGINAL"

WARNER GEAR COMPANY

MUNICE, IND.


KEEP the car in commission all winter. POLARINE maintains the correct lubricating body for winter motoring. Liquid at zero.
Fifty years' experience, master methods and equipment unite in making POLARINE the best that can be made today. When a better oil can be made we will make it.
Over 65 per cent of all motorists use it.
RED CROWN GASOLINE Car and money go farther
STANDARD OIL COMPANY (AN INDIANA CORPORATION)
Polarine
FRICTION REDUCING MOTOR OIL

DELCO

ELECTRIC CRANKING LIGHTING IGNITION

A Hundred and Ninety Thousand Delco Equipped Cars Are in Actual Use Today

That simple statement is the most convincing evidence of Delco leadership that could be offered.

A hundred and ninety thousand automobile owners in their day after day driving are realizing the soundness of Delco engineering principles and the sterling quality of Delco manufacturing practice. The Delco System was the pioneer in the electric cranking, lighting and ignition field.

And from the time the first electrically cranked car appeared Delco leadership has never been questioned.

You will find the Delco System at the Automobile Shows as regular equipment on the—

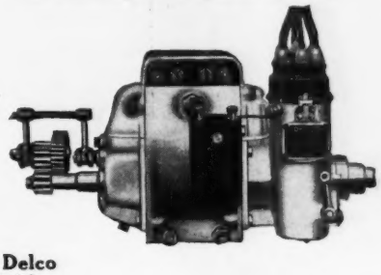
Cadillac	Hudson	Cole	Cartercar
Buick	Oldsmobile	Auburn	Jackson
Oakland	Moon	Paterson	Wescott
	Stevens-Duryea		

The Dayton Engineering Laboratories Company, Dayton, Ohio

1—Delco-Exide battery made to withstand rough usage and give constant, efficient service.

2—Combination Switch—controls entire electrical system. Strong, simple and very compact.

3—Motor-Generator furnishing current and power for starting and lighting and including entire ignition system.



These three units comprise the entire Delco System — cranking, lighting and ignition

Jeffery

A four mule team—

Inspired the building of the **Jeffery** "Quad"—the "Wonder Truck of the Twentieth Century."

The four mule team had hitherto been able to advance, at high cost and low speed, where no two-wheel-drive motor truck had ever been successfully operated.

For the four mule team was moving supplies and ammunition for the United States Army.

A little over a year ago, the **Jeffery** "Quad" sent the mules to shelter.

Today the "Quad" is in use in the Commissary and Aeroplane Corps of the United States Army—

And the government is satisfied.

The military necessity that opened the way for the **Jeffery** "Quad"—that drives, steers, and brakes on all four wheels—has given to the commercial world, the greatest truck ever built, for heavy and bad road hauling.

As a result "Quads" are pulling heavy burdens over some of the worst roads in the world—for mining concerns, lumber dealers, wholesalers, fire departments, and dozens of others, where stamina counts.

But though you may not need a **Jeffery** "Quad," there is a **Jeffery** truck to fit your requirements.

While the big "Quad" has no rival, the smaller 1½ and ¾ ton **Jeffery** trucks are obliged to recognize none. The tremendous strength of the "Quad" but expresses the proportionate ability of the smaller **Jeffery** trucks.

Don't fail to investigate the **Jeffery** commercial cars. One or more of them can save you money on an investment that is right.

DEALERS—**Jeffery** cars and prices are right. It will pay you to investigate.

The Thomas B. Jeffery Company

Main Office and Works, Kenosha, Wisconsin

See our line of pleasure cars at the Chicago Show, Coliseum, Space C3

Trucks

Jeffery ¾-Ton Truck.

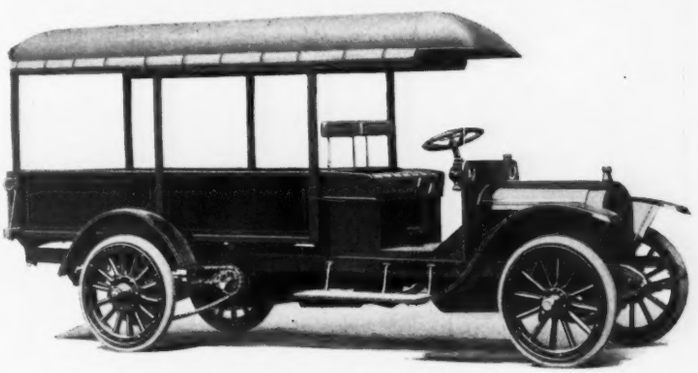
The **Jeffery** ¾-Ton Truck is suitable for the work required of 49.9 per cent of the motor trucks now in service. For quick delivery and reliability it has no equal.

Grocers, butchers, retailers generally, find economy and efficiency in their ¾-Ton **Jeffery** Trucks.

Chassis, $1300 f. o. b. Kenosha

Jeffery 1½-Ton Truck.

The **Jeffery** 1½-Ton Truck is the popular model for ordinary trucking and transfer work. This model, with express body, is used extensively by wholesale grocers, wholesale hardware houses, plumbers, transfer and express companies. It often happens that this 1½-Ton Truck, properly handled, will handle more tonnage per day than a 3- or 5-Ton Truck.

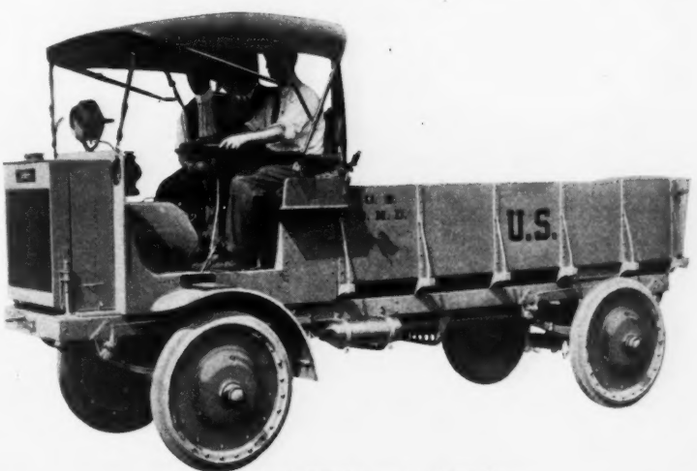


Chassis, $1650 f. o. b. Kenosha

The Jeffery Quad.

The **Jeffery** "Quad" drives, steers and brakes on all four wheels—travels through snow, mud, sand, when other trucks are stalled. Solves heavy haulage problems at less cost than heavy-duty rear-drive trucks.

The **Jeffery** "Quad" carries two tons on its back when the ordinary motor car or horse team cannot possibly move a load. The forward wheels climb while the rear wheels push.



Chassis, $2750 f. o. b. Kenosha

—and now comes the big CHICAGO SHOW ISSUE

—the biggest issue of MOTOR AGE for the year, covering the BIGGEST BUSINESS show of the year.

Impressive advertising in this issue **counts.** At Chicago Show time interest in motor cars and accessories is at its height. The car owner is making up his mind as to what his 1915 motoring equipment is to be. He is getting ready for his spring purchases.

Get in a bid for your share of this business now—at the logical time.

In addition to regular editorial comment, the January 21st issue of MOTOR AGE will contain the following special features—

A Review of the Latest Accessories

A Handsomely Illustrated Closed Car Section

A Description of 1915 Electrics with Specifications

Every car and accessory manufacturer who believes in advertising—who believes in his product—who believes in the wonderful future of the motor car industry—has an opportunity in this big Show Issue to **back** his good judgment.

All aboard for a record-smashing year!

Last Forms Close January 18th

Wire reservation for space now. Be sure to have copy in our hands by Monday noon next. If you haven't time to prepare copy yourself wire direct to our Advertisers' Service Department to prepare and send you copy for approval the same day.

MOTOR AGE

910 S. Michigan Avenue **Chicago, Ill.**

When the Salesman Says "Continental"

The salesman says "Continental." Or, "Continental—of course."

A single phrase—yet expressing everything that may be said in praise of a motor.

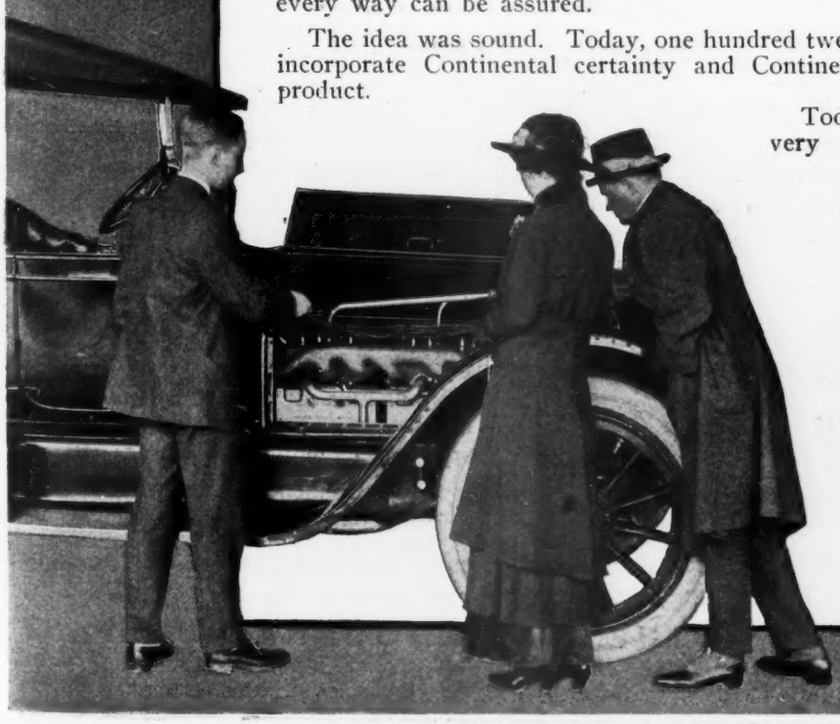
Like "sterling," as applied to the silversmith's masterpiece, it needs no further qualification. For, like "sterling," the former trade-name "Continental" has become a world-wide symbol of unsurpassed quality.

Continental Motors

When the salesman says "Continental" he implies infinitely more than the splendid piece of motor mechanism before him; he summons up a picture of the greatest motor-building organization in existence—the most conspicuous success of specialization in the automobile industry.

With a word, he describes the perfection of an idea—the idea that by doing one thing only, and doing it well; by holding intact an organization of men who have the training; by the developing of special equipment; by fair play, good wages and undivided enthusiasm, a product better in every way can be assured.

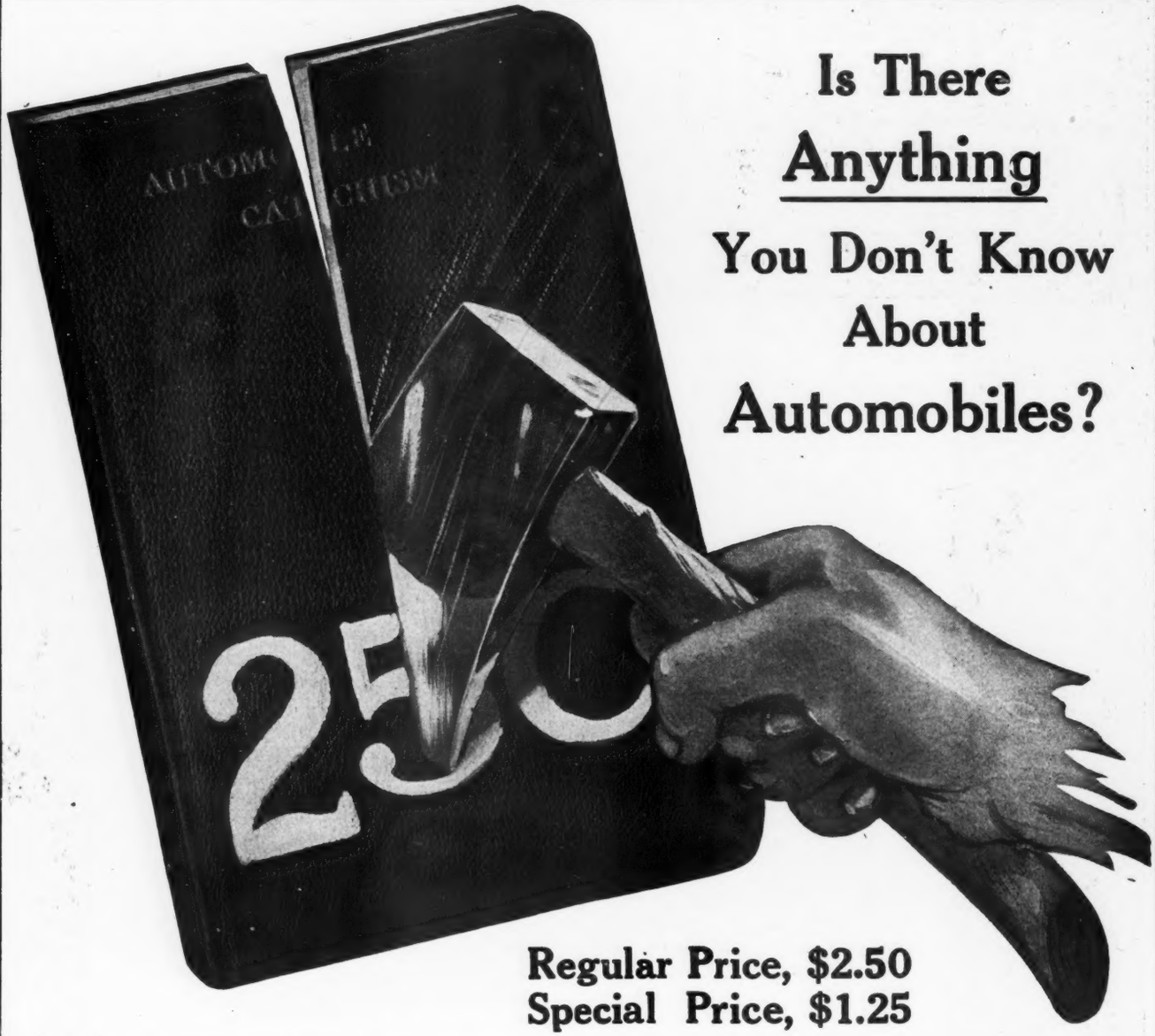
The idea was sound. Today, one hundred twenty eight manufacturers incorporate Continental certainty and Continental prestige into their product.



Today the goodwill of the very name "Continental" is worth even more than all the millions invested in the Continental factories and equipment.

Insist upon a Continental — America's Standard — in the next car you buy.

Continental Motor Mfg. Co.
Detroit, Mich.
FACTORIES
Detroit Muskegon



Is There Anything You Don't Know About Automobiles?

Regular Price, $2.50
Special Price, $1.25

"THE AUTOMOBILE CATECHISM" (de luxe edition) is a complete course in automobile instruction—every subject discussed and illustrated so that YOU will grasp every point worth while—every bit of mystery is made as simple as A B C. You are interested—you are instructed—you are directly benefited. Its information is final.

It's a handsome piece of book work — splendidly printed, with 101 illustrations; flexible black leather binding, rounded corners and gold-edged pages — beautiful, while being intensely practical.

It will be to your immediate financial advantage to acquire an intimate and practical knowledge of cars and their parts. Lack of knowledge is expensive.

We want every reader of Motor Age to have a de luxe copy of "The Automobile Catechism." To make our offer irresistible we have decided, FOR A LIMITED TIME ONLY, to CUT THE PRICE IN TWO. This half price ($1.25) will prove the best investment you ever made. Remember, this is the de luxe edition—264 pages—every page full of real, money-interest value.

Put your name and address on the corner coupon, tear from the page, enclose $1.25 and mail today to—

THE CLASS JOURNAL COMPANY
900 S. Michigan Avenue, Chicago, Ill.
231 W. 39th St., New York, N. Y.

THE CLASS JOURNAL COMPANY
900 S. Michigan Ave., Chicago, Ill.
231 W. 39th St., New York, N. Y.

Gentlemen:
Enclosed please find $1.25, for which send me a copy of "The Automobile Catechism" (de luxe edition).

Name .....

Address .....

(2)

Right Square in the Bull's-Eye
At New York Show

Detroiter Eight Proves One of Greatest Sensations in Years

The medium-priced Eight has conquered. With an avalanche of orders, both dealers and the buying public set their approval on the Detroiter Eight at the New York Show. Fours were passed by with a glance; Sixes with a pause; but the Detroiter Eight was surrounded two lines deep, from the opening to the closing of the doors of Grand Central Palace. Scores of dealers were bitterly disappointed, just because they came too late. Today, everybody in the East is talking "Eights"—and planning to buy.

$1295

MOTOR—Eight cylinders, in two enbloc L head sets. Bore 2¾", stroke 4½". Develops 34 h.p. at 1800 r.p.m. Aluminum crank case, removable fly-wheel housing. Two bearing, drop forged crank-shaft, front bearing 1⅝"x 2-3/32"; rear, 1¾"x4¼". Drop forged connecting rods, two rods to each throw, one yoked, the other between yoke arms. Single drop forged camshaft with integral cams, directly above crank shaft, each cam operating two opposite valves. Oil pump. Double jet type carburetor set between cylinders. Two-unit starting, lighting and ignition system, with distribution coil and storage battery; silent chain drive. Inertia pinion drive for starter.

EXTRA FEATURES—Actual one-man top; four 24" doors; Non-skid rear tires; Aluminum and linoleum running and floor boards; 20-operation body finish; luxurious leather upholstery; ventilating, rain-vision windshield; Duplex tire carrier in rear; Tulite searchlights; emergency search lamp; electric cigar lighter; aluminum encased instrument board. All recording instruments combined in one unit; positive gasoline gauge; electric-flash oil gauge.

Detroiter Eight Cylinder

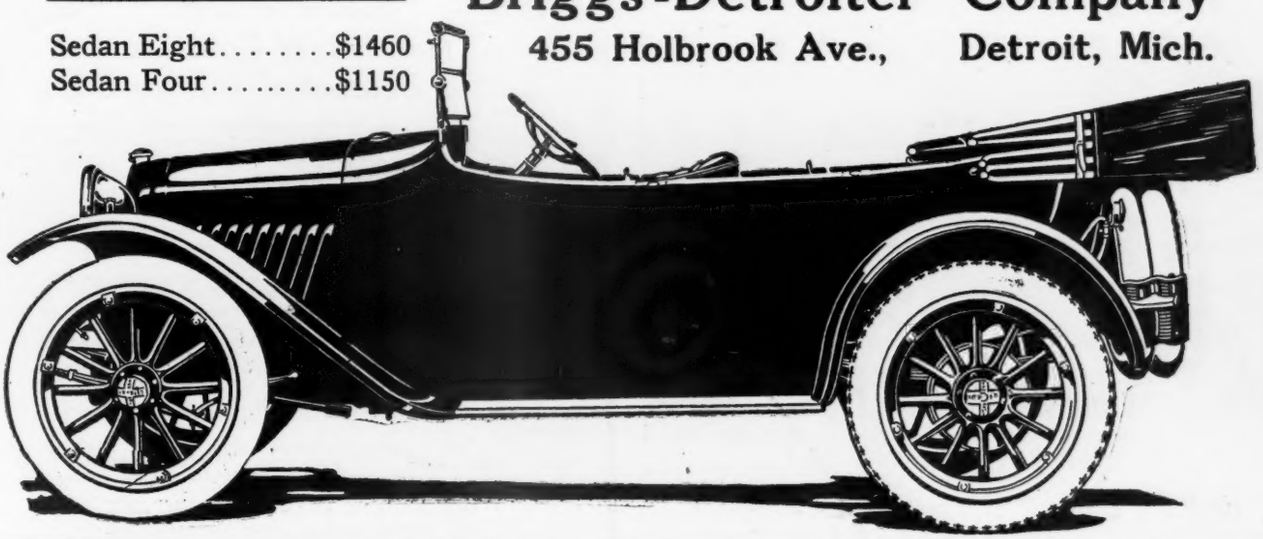
The market is clamoring for Eights. Within four months, they will be at a premium. And dealers fortunate enough to have a sure supply will be the money-makers of 1915.

The Detroiter factory has always kept faith with its dealers. It will ship Eights beginning this week. It will be into large production next month. **It will fill your orders.**

There's no room here to talk about the car. You have already had full specifications. This announcement is just for one purpose—to advise you to get our proposition quick. The safest thing is to telegraph—TODAY.

Briggs-Detroiter Company
455 Holbrook Ave., Detroit, Mich.

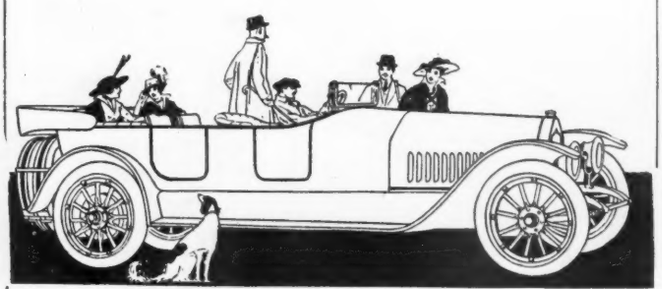
Sedan Eight.....$1460
Sedan Four.....$1150



National

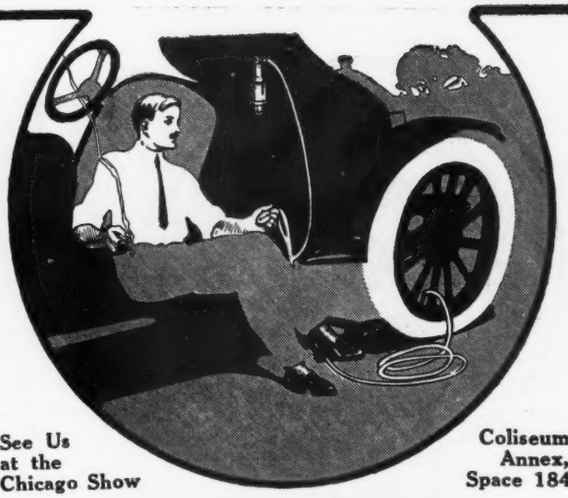
SIX—$2375

THE dealer who makes money out of the automobile business today is the one who uses business judgment as well as mechanical judgment. The exercise of both of these judgments is absolutely necessary to success. This is why *National* dealers are successful—both these judgments directed them to the *National.* Let us explain our plan for giving dealers as up to date and as liberal "business specifications" as we do "mechanical specifications." Write us for complete information about "how the dealer can make more money" along with full details of the new *National* cars.



National Sixes, $2375
Parlor Car with adjustable arm chairs, $2700

National Motor Vehicle Co., Indianapolis



See Us at the Chicago Show

Coliseum Annex, Space 184

MAYO SPARK PLUG PUMP

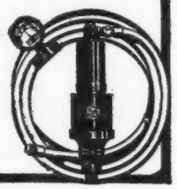
Adaptable to all size cars. Instantly attached by substituting for any spark plug. Pumps pure, fresh air only. Inflates largest tire in from 3 to 4 minutes. Built with metal rings like a motor and will last as long. Weight 2½ lbs., Price complete with pressure gauge, 12 ft. hose, all connections, $10. Quick Detachable Spark Plug $1.50 extra.

MAYO Ford PUMP

Complete with hose, gauge, all connections, Price $8

Try One Free on Your Car For 30 Days. Write us.

COMPLETE $10 WITH GAUGE



MAYO MFG. CO.
55 E. 18th St. CHICAGO

STEER WARMS

Insure Warm Hands and Comfort on the Coldest of Winter Days

STEER WARMS consist of two **electrically heated,** leather covered grips that lace on the steering wheel. They keep your fingers and hands from becoming chilled on the rawest day—and that means you are warm all over.

They take only a minute to attach. Lace on; wire up. That's all. No marring the wheel. No holes to bore. A switch conveniently located regulates the heat. The current is taken from the battery, electric lighting system or magneto. Very little current required. Steer Warms guaranteed to give satisfaction and not to burn out within five years.

PRICE: $7.50 per pair complete, ready to attach to any car. Special STEER WARMS for Ford cars, $5.00.

The IECO Electric Manifold Plug combines three separate devices into one. First, it is a primer and from the dash you can prime your car without raising the hood. Second, it is an electric vaporizer, which enables you to start your car almost instantly on the coldest winter day. Third, it is a gasoline saver when used as an auxiliary air valve, saving at least 20% to 30% of your gasoline expense.

Material and workmanship are fully guaranteed. Booklet upon request.

DEALERS: Car owners everywhere want STEER WARMS and MANIFOLD PLUGS. Get your share of this business. We back you up with our positive guarantee. Write for our discounts.

INTERSTATE ELECTRIC COMPANY
362 Baronne St., New Orleans, La.

THE NATIONAL AUTO SHOW

Under Auspices of National Automobile Chamber of Commerce, Inc.

At CHICAGO

Coliseum

and

1st Regiment Armory

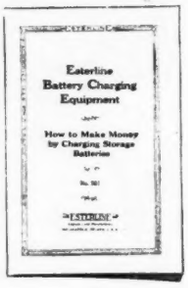
January 23—30

Passenger Vehicles—Parts Accessories

S. A. MILES, *Manager* Auditorium Hotel, Chicago

The Usual Courtesies to Visiting Dealers

Do You Make Money Charging Storage Batteries?



Tests show that the old style lamp bank resistance method makes it cost most garages about 44c to charge the average 6 volt battery.

This Free Book Brings Bigger Profits to Every Live Garage

It shows you how you can do for 6c what has been costing you six or seven times that amount.

It points a way to a big, new, legitimate profit in your business. Shows you how to secure a complete, tested, automatic outfit that requires no attendant, at moderate cost. Soon pays for itself.

Send for It—Today!

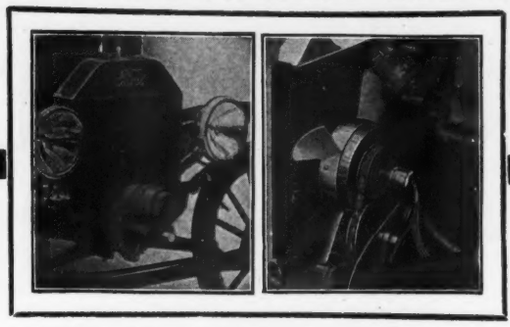
The information in this free book is too important to miss. Take time, right now, to send your name and address to—

The Esterline Company

223 E. South St. INDIANAPOLIS, IND.

Two-Unit **Kemco** Electric

STARTING-LIGHTING SYSTEM



SEE IT AT THE SHOW

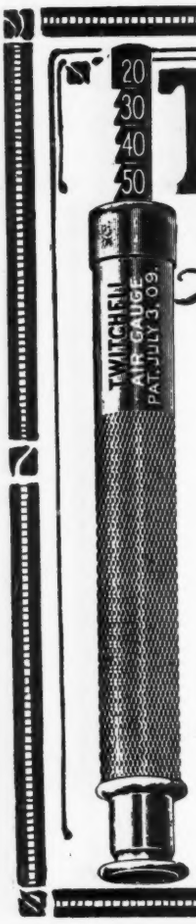
CHICAGO

Coliseum Annex, Space 147-148

Second Floor

Dealers—Make it a point to visit our exhibit and let us explain the merits of this wonderful outfit. Let us show you why it is the most reliable, easiest selling and most profitable outfit for you to handle.

The Kemco Elec. Mfg. Co. 2233 Ashland Road Cleveland, Ohio



Twitchell *Air Gauge*

The New Positive Lock Stop feature renders absolutely impossible the registration of any but the exact pressure in your tires.

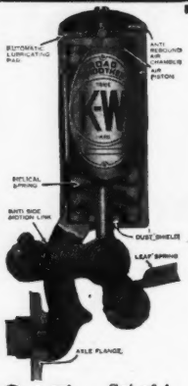
Don't Guess

Tires inflated to forty pounds look and feel exactly like tires containing eighty. The only way to tell the exact air pressure in your tires is by means of a TWITCHELL gauge.

Price One Dollar

For Sale by Jobbers, Dealers and Garages, or

THE TWITCHELL GAUGE CO.
1201 MICHIGAN AVE., CHICAGO



$15 Set of 4 1 for Each Wheel

Any Ford owner

Using a Set of

TRADE K-W MARK

Road Smoothers

Reg. U. S. Pat. Off.

Quickly Applied to Your Ford Car

will tell you that they smooth out the roughest roads, and save wear and tear on both his car and tires. He will tell you that they need no attention and will stand the gaff of the roughest rutty roads.

The reasons for this are—K-W Road Smoothers combine the three essential features necessary for long, lasting service, and your comfort. The helical spring takes up the shock; the air-chamber checks rebound, and the anti-side-motion links prevent side-rocking.

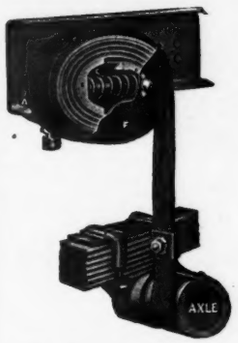
Every K-W Road Smoother is thoroughly tested and perfectly built, and of these materials: High-grade heat-treated drop forgings; electric smelted chrome vanadium steel springs, and extra heavy phosphor bronze bushings thruout.

K-W Road Smoothers are sold by dealers who know the difference, everywhere. If your dealer cannot supply you, sent direct on receipt of price. Write for booklet, "Taking Out the Bumps."

HEADLIGHTING OUTFITS — THE K-W IGNITION Co. 2835 Chester Ave. CLEVELAND, OHIO, U.S.A. — SPARK COILS SPARK PLUGS

GABRIEL SNUBBERS

The accepted standard device for making cars ride easy and last longer



It costs only $15, $20 and $25 to have a set of four Snubbers on your car; half that per pair.

How much does it cost in wear and tear, depreciation and the many discomforts of rough riding, to be without them?

Catalog sent on request

Gabriel Horn Mfg. Co., 1415 East 40th Street, Cleveland, Ohio

COMFORT WITHOUT EXTRAVAGANCE

HOTEL WOODSTOCK

WEST 43d STREET JUST EAST OF **TIMES SQUARE** :: :: **NEW YORK**

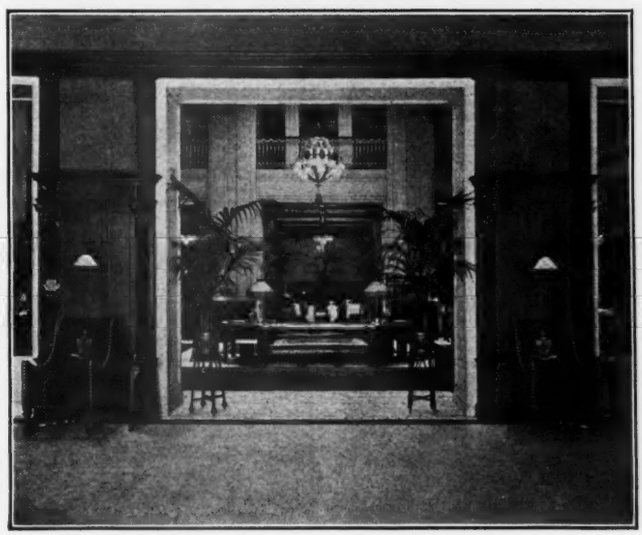
360 ROOMS

265 BATHS

EUROPEAN PLAN

COURTEOUS ATTENTION

HOMELIKE ATMOSPHERE



MODERATE PRICES

ROOMS With Use of Bath
For One, $1.50 & $2.00
For Two, $2.50 & $3.00

ROOMS WITH BATH
For One, $2.00 to $3.00
For Two, $3.00 to $4.00

SUITE TWO ROOMS & BATH
$6 to $8

WIRE FOR RESERVATION AT OUR EXPENSE

W. H. VALIQUETTE, *Manager* **A. E. SINGLETON, *Asst. Manager***

BRAENDER
Tires & Tubes

Trade Mark

Service and Satisfaction

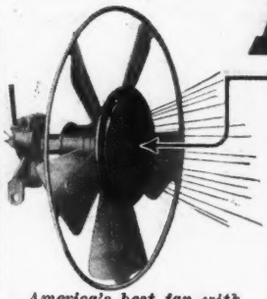
The *only* set of tires to complete the entire 500-mile race at Indianapolis, May 30, 1913. Consider that 88 tires of other makes were changed in this race.

Our "Victory Folder" explains other races.

Established Agents Solicited

BRAENDER RUBBER & TIRE CO.
Main Office & Factory, RUTHERFORD, N. J.
New York, 250 West 54th Street
Agents in principal cities

Bull Dog Non-Skid



Beartone
HORN AND FAN

America's best fan with horn as integral part

¶Write for complete information about this new motor car horn, built by America's greatest manufacturers of fans Something new and better. No gears, motor, batteries or wires to give trouble: gives warning signal by merely pushing button; gives any tone from polite whisper to loud, far-reaching noise; increases fan efficiency; never fails; long life; is easily interchangeable with fan on any car, in minute's time; requires no lubrication other than fan requires; a motor car horn is for safety—then get the SAFEST, most reliable and efficient horn—the Beartone. Write

THE OAKES CO., Indianapolis, Ind., U. S. A.

How is your gas—good quality or rotten ? ? ?

The numerous jets of the MASTER Carbureter break fuel finer. Hence better combustion with the present day low grade fuel.

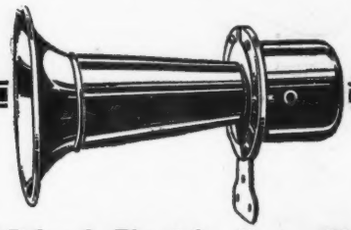
MASTER
Reg. U. S. Pat. Off.

Yields more Power with greater Economy
No Adjustments

LIVE DEALERS ARE WRITING FOR TERRITORY—YOU?

Master Carbureter Corporation Woodward & Hancock Avenues, Detroit

Pacific Coast States—Master Carburetor Co., Inc., Los Angeles, Cal.



Lowest Priced Electric Horn Obtainable

REXO II
$3.85—Ready to Attach

Guaranteed for the Life of Your Car

THE GARFORD MFG. CO., 2503 Olive Street Elyria, Ohio, U. S. A.

PAIGE
Model "36" $1195.00

A car whose design and construction is so far ahead of others at its price that it is in a class all its own.
Gray and Davis Electric starting and lighting equipment, silent chain cam shaft drive, four inch by five inch motor, cork insert multiple disc clutch, 116 inch wheel base, left side drive, center control, and equipment complete to the last detail.

Model "25" $925.00
Including Electric Starting and Lighting System

This model has made the Paige reputation. Such a sturdy, powerful, comfortable car has never been offered the public at anywhere near its price. $925.00 with complete equipment.

Splendid Agency Proposition

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Write to-day for our Territorial Agreement on the

New $1000
Inter-State
"FOUR"

The one popular priced car with the greatest selling arguments in the country.

Inter-State Motor Co.
802 W. Willard St.
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THINK THOUSANDS OF MILES AHEAD, AND YOU WILL BUY
REPUBLIC MILEAGE
PLAIN AND STAGGARD TREAD
TIRES

THE REPUBLIC RUBBER CO.
YOUNGSTOWN, OHIO.
BRANCHES AND AGENCIES IN THE PRINCIPAL CITIES

NEW VULCAN "35"
"A Quality Car at a Quantity Price"

PRICES

TOURING CARS 5 PASSENGER **$975** ROADSTERS 2 PASSENGER

Completely and fully equipped, with Westinghouse Starting, Lighting and Ignition System

F. O. B. PAINESVILLE OHIO

Manufactured by VULCAN CAR CO., Painesville, O.

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have experienced a tremendous demand. More dealers are desired—also local managers in every city and county to extend distribution. Attractive proposition. Hurry! Ask for particulars.

This glareless glass fits any automobile headlight. Deflects rays without diminishing light. No glare. Avoids accidents. Equally good for city or country driving. Nothing else like it.

Endorsed by Chicago and other municipal authorities where glaring headlights are condemned. Retail $5 the pair. Money-back guarantee. If your dealer cannot supply you, order direct.

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For War—Recommended by American and Foreign Experts for motor car service.

For Peace—Used all over the United States on cars of all sizes. Comfort and absolute freedom from tire annoyances.

For Fords—We are obliged to double our production on these sizes every three months. Enough said.

For All Cars—A tire that is absolutely blow-out proof and puncture-proof.

For You—Write today for full details and name of nearest dealer.

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DAYTON, OHIO

HERZ PLUG

The reasons for HERZ PLUG'S superiority to ordinary makes are definite and obvious.
The insulation is DOUBLE STONE. The electrodes are PLATINUM-ALLOY. There are FOUR SPARKING POINTS. HERZ PLUG is SELF-CLEANING. It is GUARANTEED A FULL YEAR.
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IT'S GETTING COLD

but your engine will start as quickly as in Summer and the cylinders will fire as regularly if equipped with

Red Head
REG. U. S. PAT. OFF.

1915 PRIMING PLUGS
Masters the motor at any temperature
All Sizes **$1.25** Porcelain or Mica

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YOU CAN

Blow an electric horn
Burn your lights
Run your engine
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Complete System $50.00

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Complete System $50.00

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Dealers, write

XCEL-O-LYTE COMPANY (Formerly Best-Lite)
NEWTON, IOWA

WARD LEONARD

25 years experience.

DYNAMO CONTROLLERS

For Lighting and Starting Systems

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NEW PRICE With Gauge and "T," $5.50

Built like a motor with lapped rings. A high grade pump at a small price for medium size tires. You cannot afford to run your car without this pump.

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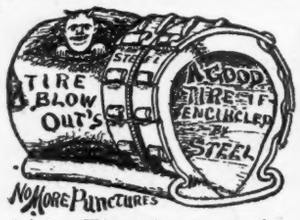

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Each section 2" wide 1/8" thick. They hook to rim. As flexible as ever. Anti-skid, can't blow out or rim cut.

HOW CAN THE RUBBER WEAR OFF IF IT IS COVERED WITH STEEL?

Try 2 or 3 sections over any old blowout

Special prices to the first in new territory

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Tire covered complete

No Garage Can Do Without

the means to determine promptly the exact condition of the electrical equipment of any automobile.

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are absolutely dependable in locating trouble in starting and lighting systems, or proving its absence. Built to conform in every way with the exacting Weston standard, they are accurate, serviceable, reliable, yet inexpensive. Write for special booklet describing Model 280.

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It contains descriptions of all the famous Campbell Motor Car Accessories; Seat Covers, Percama, Johnson Model "D" carburetor, Straps, Boots, etc., etc.

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A REAL AUTOMOBILE

The lightest, strongest, most serviceable and economical machine of its kind ever built.
112 inch wheel base. Electrically started and lighted.

Sphinx Motor Car Company, York, Pa.

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USED FOR BRAKE LINING - CLUTCH FACING

Manufactured by THE ROYAL EQUIPMENT COMPANY Bridgeport Conn.

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Hyatt Quiet Bearings are used in the majority of American made Automobiles

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All speedway and road records of the 1914 season were records for the Bosch Magneto too.

—DON'T CHANCE IT—

Be Satisfied Specify Bosch

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SINGLE UNIT

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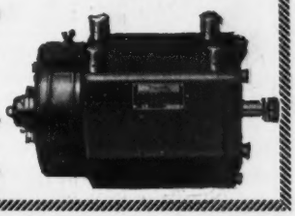
Electric Starting and Lighting System

Famous on the Franklin

Weighs less than two-unit systems. Naturally more efficient and less complicated than either one of two units.



A Combination Motor Generator

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Miller Tires

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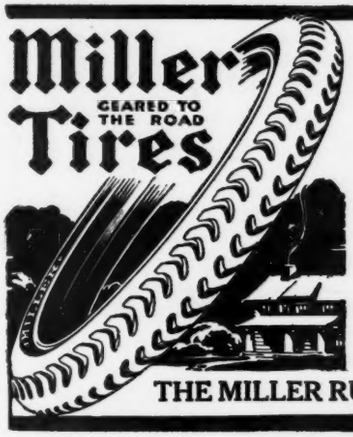

Miller don't pit one dealer against another

One dealer in a town insures a good profit to dealers just as the "geared to the road tread" insures Safety and greater Mileage to users. Write for the Miller plan.

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"The Easiest Riding Car In The World"

"41" $3250 132" Wheelbase

"48" $5000 145" Wheelbase

Nordyke & Marmon Company
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"Over Sixty Years of Successful Manufacturing"

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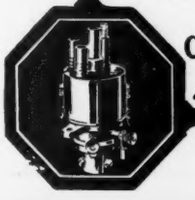

Gives its hottest spark for starting and at low speeds.

Gives a better spark than the magneto at highest attainable speeds.

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MORE QUALITY for LESS MONEY

The Horn that Speaks For Itself

$6

The Handphone

Three Year Guarantee

Hear and inspect one, compare it with others and judge for yourself. The Most Efficient Hand Horn Made.

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Guaranteed for 10,000 Miles
Brictson Pneumatic Tires

We now sell Brictson Pneumatic Tires on a specific guarantee of 10,000 miles service. *Brictson Pneumatic Tires* are Puncture-proof, Blowout-proof, Skid-proof, Rut-proof, Rim cut-proof, Oil-proof and Gasoline-proof. A tire with wonderful resiliency and easy riding qualities.

FREE TRIAL OFFER—To remove any possible doubt concerning the merits of Brictson Tires and to back up our statements fully, we have a FREE TRIAL offer at our own risk. The only tire made that offers a FREE TRIAL—you can't go wrong. You risk nothing. We take all the risk. Be sure and ask for our FREE TRIAL plan when you write for particulars.

Have Your present Tires Rebuilt the BRICTSON WAY⟶ If you are not in need of new tires and the fabric in your tires is still good, we can rebuild them the Brictson Way, give you thousands of miles additional service and make them Puncture-proof, Blowout-proof, Skid-proof, Rut-proof, Rim cut-proof, Oil-proof and Gasoline-proof.

Write today for full particulars including details of FREE TRIAL PLAN.

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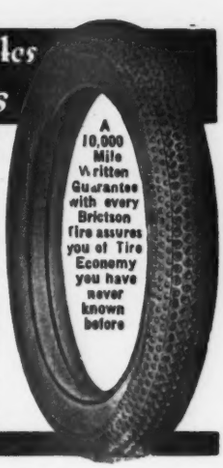
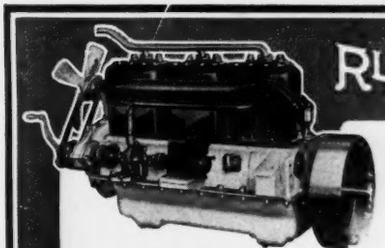
1215 Brictson Bldg., Brookings, S. Dak.





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Eighty Per Cent of the efficiency of any motor car depends on the performance of the motor.

YOU can be certain of ECONOMY in OPERATION and MAINTENANCE, Smooth Running, Super-Quality and Appearance, Long Life, Speed, Endurance and Service when you select a car that carries a RUTENBER MOTOR—Four or Six.

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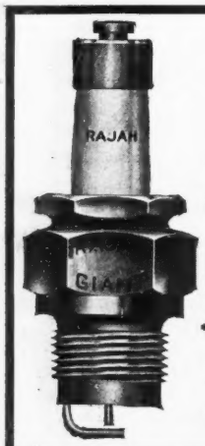

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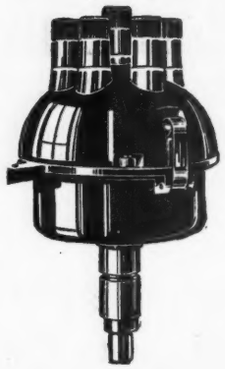
See how "RAJAH" Plugs predominated in the Corona Road Race when the new World's Competition Record of 87.8 M. P. H. was made by Pullen in a Mercer.

1 Mercer	Pullen	RAJAH*	87.8
2 Maxwell	Oldfield	RAJAH	86.3
3 Duesenberg	O'Donnell	Foreign	86.
4 Mercedes	DePalma	Other make	85.
5 Gordon Special	Gordon	RAJAH	84.
6 Maxwell	Carlson	RAJAH	78.5

*Double ignition, one set each RAJAH and other make.

For steady, reliable service under any and all conditions use RAJAH PLUGS

RAJAH AUTO-SUPPLY CO., BLOOMFIELD, N. J.



The Atwater Kent Ignition System

Adopted by 60 Manufacturers in the Past Year

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For best results use

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Acetylene Service for Oxy-Acetylene Welding and Cutting.

The purest and dryest form of compressed acetylene, delivered to you in steel cylinders.

Open the valve and gas is ready.

Let us solve your acetylene problems.

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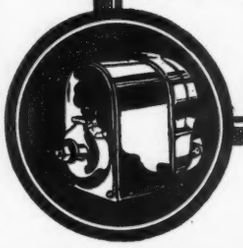
The most simple—the most accessible—the most durable—the most efficient magneto ever produced is the new Type G-4.



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Sales and General Offices,
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Indianapolis Ind. 514 N. Capitol Ave.
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Are easy to use and easy to sell. They are durable and efficient and are widely advertised. The cylinders are of seamless brass tubing which cannot rust. The "Stapley," the "Aeolus," "Windjammer," etc., give lasting satisfaction. Carry them in stock.

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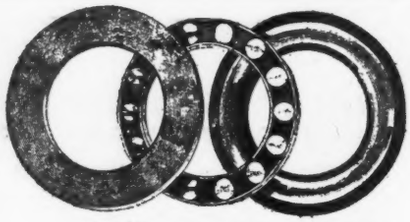

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RADIAL RETAINERS

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Manufacturers of Radial Ball Retainers, Thrust Ball Retainers, Complete Thrust Bearings

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For seven years the unchanging standard of quality motor vehicles

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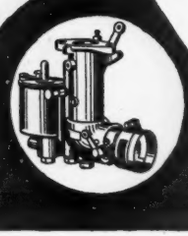

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Wisconsin MOTORS

CONSISTENT

Dependability

After all it is the motor that keeps on going that makes automobiles and motor trucks a success. Wisconsin Motors, both the auto type and the truck type, have proven that they are

ABSOLUTELY CONSISTENT

You can always rely upon them. You can always be sure that you will keep on going. When you hear one running—(and they operate so quietly that it's hard to hear them) you never hear that disagreeable "thump" which accompanies the operation of so many motors—you hear nothing but the rhythmatic purr of a perfectly constructed motor.

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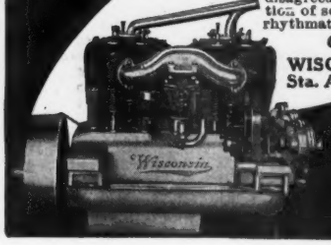

MORE MILES -LESS GAS

WINTON SIX

First in a New Class

This car is unlike any you ever saw before. It is first in a new class. In this car you can possess—now for the first time—this unprecedented combination:

A car of happy-medium size, rich in superior qualities, at a price lower than ever quoted before—$2285. And we finish your car in your own personal color scheme. Send for illustrated catalog.

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424 Berea Road, Cleveland, O.
World's First Maker of Sixes Exclusively.

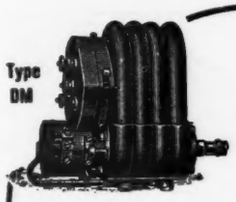
Use MODEL MOTORS and BE SATISFIED

Two New Sizes

2¾ x 4½—"4," and 3 x 5—"6"

SPACE 119-120-121 COLISEUM ANNEX, CHICAGO SHOW

Pittsburgh Model Engine Company
Lexington St. and Pennsylvania R. R., Pittsburgh, Pa.
Factories—Pittsburgh, Pa., and Peru, Ind.



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The performance of **HEINZE IGNITION APPARATUS** for the past ten years justifies our claim that our product is superior in both points of construction and efficiency.

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It is a guide and text book that will post you thoroughly. It tells the proper inflation according to weight, load and season. It describes fully how to protect the tires while car is idle in the garage—how to care for them in winter—how to avoid substances that rot the rubber and fabric. It gives splendid hints on the spare tire and its care—how to carry extra tubes. It explains the tire sleeve, the blow-out patch—repair plasters and plugs and emergency or temporary repairs. This book is quoted as an authority by American and Foreign Automobile Publications, because of the authentic information it contains. It's *free* to any motorist. No obligations. Just write and we will send it to you without cost.

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Give YOUR Car a Fair Show

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CRITERION OF ITS CLASS

Thoroughbred Six—$1875 Famous Four—$1375
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All equipped with the Moore Multiple Exhaust

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KINGSTON IGNITION DEVICES

High and low tension magnetos, make-and-break coils, dash coils, box coils, motorcycle coils, switches, spark plugs and other ignition specialties. Guaranteed satisfaction

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KisselKar 36 "Four"
$1450

The All-Year Car

Biggest idea of the year in body design.

Every inch a Car **KISSELKAR** Every Inch a Car

Two-Door Body and Detachable Sedan Top afford the KisselKar owner all-weather service at but $350 additional.

Ask for Details

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Detachable Sedan Top, $350 addi.

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See the new enclosed Ford cars

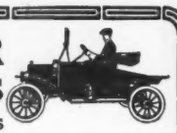
The Coupelet, a luxurious two-passenger car, and the five-passenger Sedan, a roomy, stylish family car. Prices of the Ford line: Coupelet $750; Sedan $975, Runabout $440, Touring Car $490, Town Car $690 f. o. b. Detroit fully equipped.

Ask nearest Ford branch or dealer about Ford profit-sharing with retail buyers.

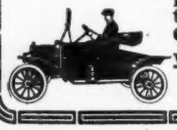
Ford Motor Company

Detroit, Mich.

BOSTON STARTER For FORD CARS



¶ Fully Guaranteed. ¶ Does the work. ¶ Cost—a fraction of electric starting cost. ¶ No harm to car; does not interfere with cranking in usual manner. ¶ Releases in case of backfire. ¶ Retards spark automatically before starting. ¶ Time tried success—no experiment. ¶ Be sure you get the BOSTON STARTER. ¶ Ask the Ford dealer or your dealer or write.



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Oilproof
VACUUM CUP TIRES

Making their mark everywhere

Guaranteed for 4500 miles

Pennsylvania Rubber Company

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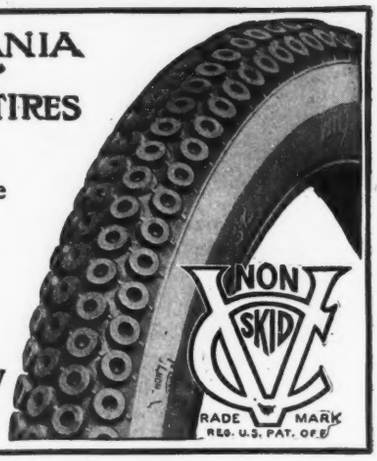

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for the low—the medium and the high priced cars, motor driven & hand operated.

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Appeal to the man who has had experience in the use of motor trucks.

To him their quality points, the individual clutch transmission, guaranteed springs, self-starter, etc., mean a definite saving in operating costs.

The full line, 1 to 6 tons, is described with all its features in our complete catalog, which will be sent you on request.

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"The Accepted Standard"

The New Stromberg Carburetors make records for Economy, Power, Acceleration and Smoothness of Running.

Write for Information

Send us make and model of your car and we'll tell you which new model Stromberg is best adapted for it.

STROMBERG MOTOR DEVICES CO., Chicago, Ill.

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Universal Valves

Trade Mark Reg. Apr. 30, 1895.

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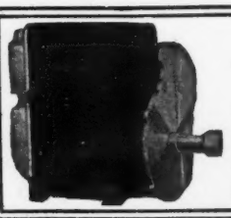

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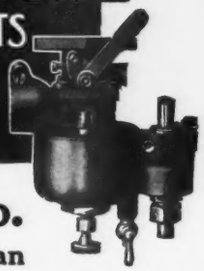
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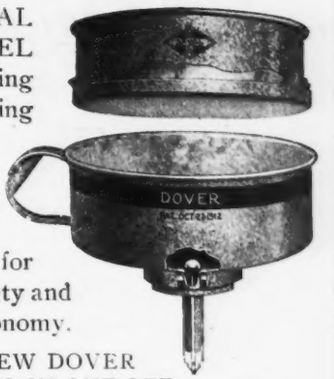
THE DOVER SAVAL SHUT-OFF FUNNEL saves Gasoline. Lifting the funnel from the filling hold automatically stops the flow of gasoline. Doesn't allow dripping or wasting of fuel. A necessity for safety and economy.



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Stamping & Mfg.Co.
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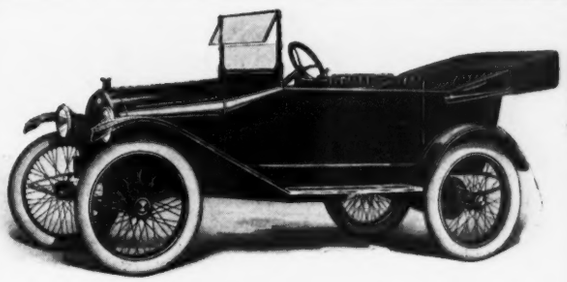

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The Quality Car

$600 Touring Model, Equipped Complete, Including Electric Starter and Electric Lights

DEALERS: The METZ "25" Touring Model meets every requirement of the prospective customer who demands a thoroughly good car. It is graceful in design, delightfully easy riding, economical in upkeep, and so simple in operation that a woman can safely drive it. Best equipment throughout, including Gray & Davis electric system, rain-vision wind shield, instant one-man top, 32-inch wire wheels, 3½-inch Goodrich clincher tires, speedometer, signal horn, Bosch magneto, Hyatt roller bearings, etc., etc. We want representation in your territory.

Write for particulars and new catalog "K"

METZ COMPANY Waltham, Mass.

Stearns

THE ULTIMATE CAR
(KNIGHT TYPE MOTOR)

Mdl	Motor	Ignition	Carbtr	Starter	Cloh	Gst	Wb	Tires	5-Tour	6-Tour	7-Tour	Rdstr	Cabrlt	Land	Lim
L-4	4-3¾ x 5½	Bosch	Shblr	G & D	Cone	3	119	34 x 4	$1,750	.....	.....	.....	2,250	.....	2,850
B-4	4-4¼ x 5½	Bosch	Stmbg	G & D	Disk	3	121	36 x 4½	3,750	3,900	3,900	3,750	.....	5,100	5,000
Six	6-4¼ x 5¾	Bosch	Stmbg	G & D	Disk	4	140	37 x 5	4,850	5,000	5,000	4,850	.....	6,200	6,100

Improvements—The small four is new throughout and in addition to being the lowest priced Knight-motored car on the American market is nearly $1,000 less than any previous Stearns. The motor is block-cast and incorporates many characteristic features, among the most important being a counter-balanced crankshaft. Other features are an exceptionally light cylinder block, incorporating the intake and exhaust manifolds, light construction in the crankcase, the timing chain cover and other parts where strength is not a primary consideration being stampings; connecting rods are tubular and are balanced by a short extension of the tubular shaft from the connecting rod cap. In place of the trough system used in earlier Knight motors, pressure lubrication, operating at 15 to 60 pounds and feeding the main bearings, is used. Spiral bevels are used for the first time and the forged type axle housing has given way to one of pressed steel; the service brake is now on the gearbox and cantilever rear springs have been introduced. The body is a clean line creation with the gasoline tank housed in a deep cowl. The other two Stearns models are continued practically without change. Standard colors are green body and running gear with light green striping in the small four, and either maroon, green or blue body and running gear with a lighter shade of striping in the other models. Equipment is standard and includes a power tire pump. Rudge-Whitworth wire wheels are extra.

Selling features—The Stearns name; Knight motor; the first Knight-motored car to sell under $2,000; a high-grade car built by a company for 18 years consecutively building high-grade cars yet selling for the price of $1,750; light weight; flexibility; speed; economy; cowl gasoline tank; propeller shaft foot brake and cantilever rear springs; strictly high-grade finish in painting, upholstering, top work, etc.

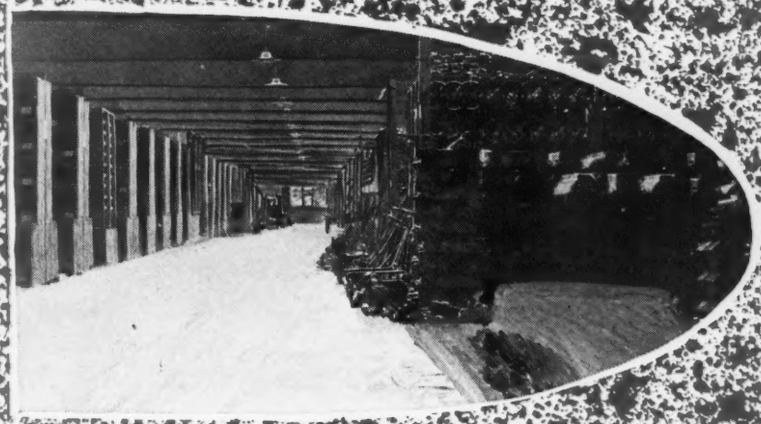
In every community there are Stearns-Knight prospects.

In every community there is an opportunity for a Stearns-Knight dealer.

Read the text matter on this page and then, if you are a dealer and we are not represented in your territory, communicate with us immediately.

THE F. B. STEARNS CO.

Euclid and Lakeview Aves. and Belt Line R. R. ∴ ∴ CLEVELAND



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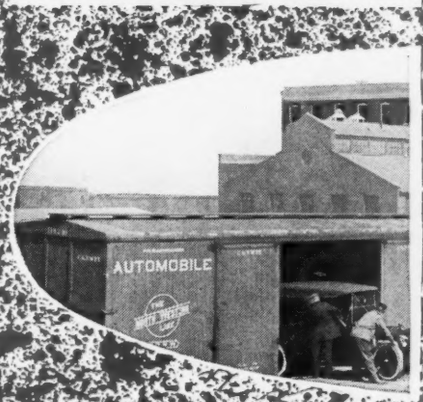

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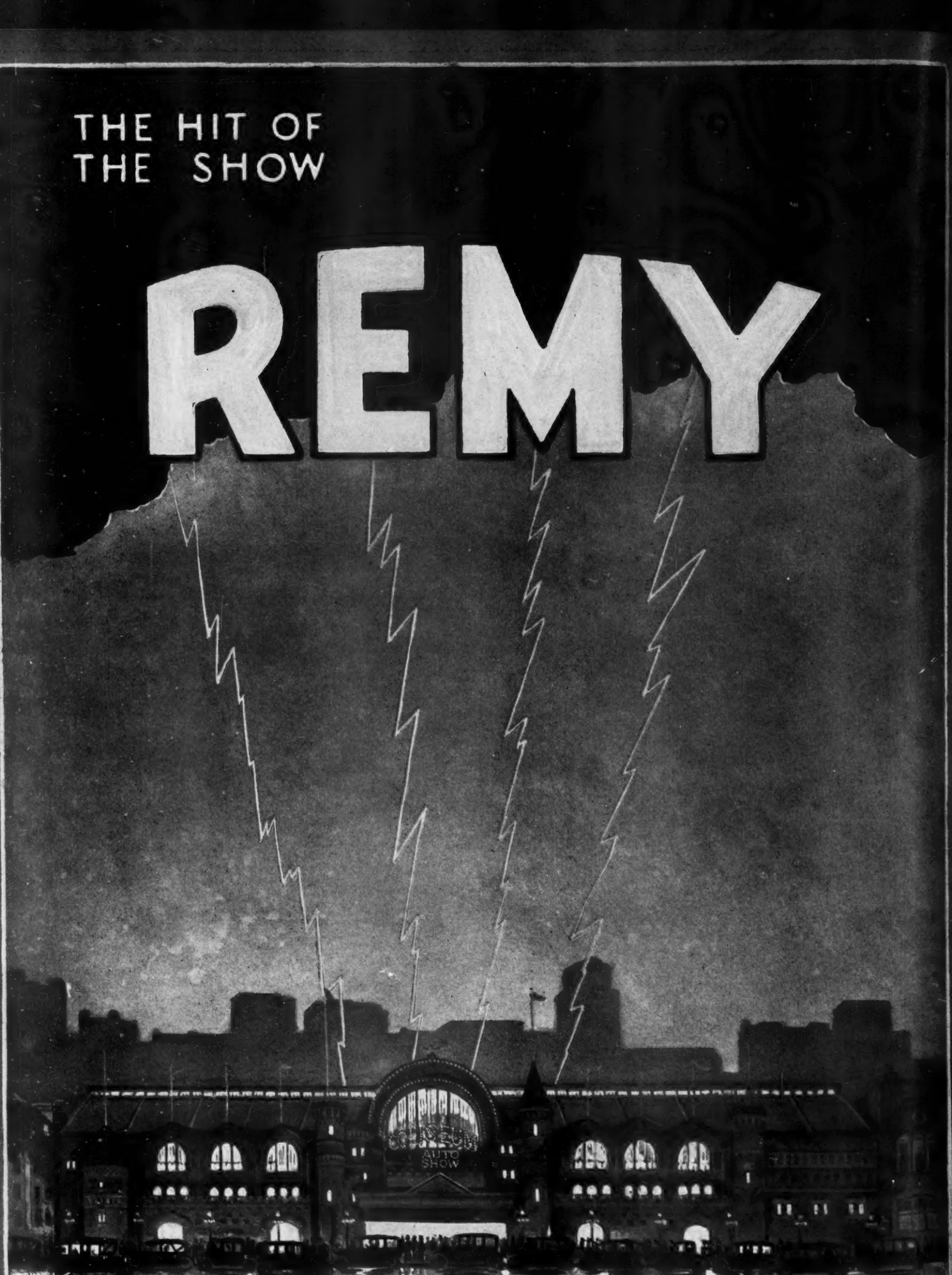

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